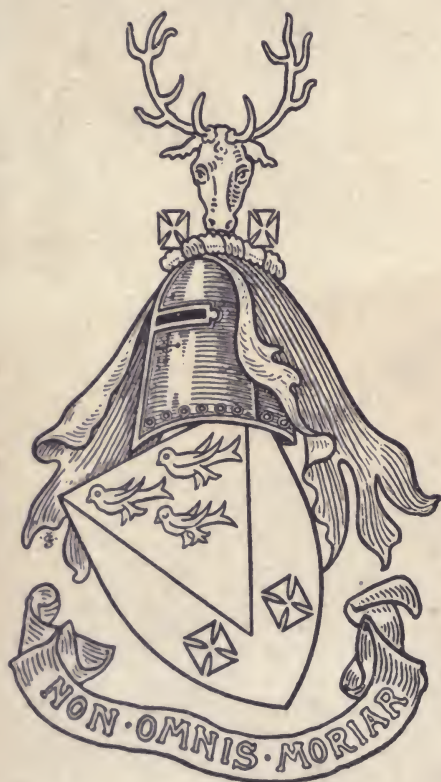


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Bertram C. A. Windle,

LL.D., D.Sc., R.S.G., F.R.S.

DR MUNRO, who has been for years known as an authority upon lake-dwellings and kindred constructions, has included the reports of two courses of lectures (the Munro in Edinburgh and the Dalrymple in Glasgow) in his handsome and excellently illustrated volume (*Palæolithic Man and Terramara Settlements in Europe*. Edinburgh: Oliver & Boyd. 1912. Price). Of the first and larger portion of the book something has been said elsewhere in this Review, and it is only necessary to add that in it is contained a very careful and adequate summary of what is known, or was known at the time of the delivery of the lectures, for fresh facts of prime importance have since come to light, as to Palæolithic Man, his physical remains, his places of habitat and his manufactures.

The second part of the book deals with a much less well-worn subject than the first, for up to the present no complete account of the curious type of edifice known as terramara has appeared in this country; the best account in English with which we are acquainted being that in Mr Peet's *Stone and Bronze Age in Italy*, which was noticed at the time of its publication (in 1909) in this Review. The settlements of the terramara character which have been discovered in the Po Valley may be best thought of as pile-dwellings on dry land, and their relationship to the pile-dwellings of the ancient inhabitants of Switzerland who constructed similar villages in the lakes of that country, and, it may be added, to the Swiss chalet, which is in some sense their descendant, become questions of great interest to the scientific antiquarian.

It is for such that Dr Munro writes, for his work is not one which will appeal to the casual reader, though it will be prized by and will be of great value to the serious student.

B. C. A. W.



THE MUNRO LECTURES, 1912

PART I.—ANTHROPOLOGY

PALÆOLITHIC MAN IN EUROPE, WITH SUPPLEMENTARY
CHAPTER ON THE TRANSITION PERIOD

PART II.—PREHISTORIC ARCHÆOLOGY

TERREMARE, AND THEIR RELATION TO LACUSTRINE
PILE-STRUCTURES

WORKS BY THE SAME AUTHOR

1882. **Ancient Scottish Lake-dwellings or Crannogs.**
Edinburgh : David Douglas. (*Out of print.*)
1890. **The Lake-dwellings of Europe.** Profusely illustrated.
Cassell & Co., London. (*Out of print.*)
1895. **Rambles and Studies in Bosnia, Herzegovina, and Dalmatia.** With an Account of the Proceedings of the Congress of Archaeologists, held at Sarajevo in 1894.
1900. Second Edition, greatly enlarged.
William Blackwood & Sons.
1897. **Prehistoric Problems.** Containing the Author's Address as President of the Anthropological Section of the British Association for 1893, on "The Relation of the Erect Attitude to the Development of the Brain."
William Blackwood & Sons.
1899. **Prehistoric Scotland and its Place in European Civilization.** William Blackwood & Sons. (*Out of print.*)
1905. **Archæology and False Antiquities.** With numerous illustrations. London : Methuen & Co., 36 Essex St., W.C.
1904. **Man as Artist and Sportsman in the Palæolithic Period** (being the Friday Evening Address at the British Association, 1903).
Edinburgh : Robert Grant & Son, 107 Princes Street.
London : Williams & Norgate.
1908. **Les Stations Lacustres d'Europe aux Ages de la Pierre et du Bronze.** Translated by Dr PAUL RODET. Only the portions of Dr Munro's work dealing with the Stone and Bronze Ages are here translated.
Paris : Librairie C. Reinwald.
Schleicher Frères, Editeurs.



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Double-handed Saws from Polada Lake-dwelling. (The upper casing contains four flints; the lower shows the groove for the flints, and the bend in the handle.) (Photo by Dr Rambotti.)

PALÆOLITHIC MAN

AND

TERRAMARA SETTLEMENTS IN EUROPE

BEING THE MUNRO LECTURES IN ANTHROPOLOGY AND
PREHISTORIC ARCHÆOLOGY IN CONNECTION WITH THE
UNIVERSITY OF EDINBURGH

Delivered during February and March 1912

BY

ROBERT MUNRO, M.A., M.D., LL.D.

WITH 75 PLATES AND 174 FIGURES IN THE TEXT

EDINBURGH

OLIVER AND BOYD, TWEEDDALE COURT

LONDON: GURNEY AND JACKSON

1912



PREFACE

THIS volume contains the Munro Lectures in Anthropology and Prehistoric Archæology for 1912, being the first course since the Lectureship was founded. With the exception of a few changes in phraseology, in consequence of dividing the lectures into chapters—an alteration which became necessary in order to arrange the materials under more appropriate headings—the letterpress remains unaltered. The chapter on the Transition Period is supplementary to Part I., the intention being to show some of the connecting links between the Palæolithic and Neolithic civilisations—thus partly accounting for the fate of the old-world hunters.

As to the selection of the subjects of the lectures, I have only to say that Part I. was chosen on *con amore* grounds, and as one pregnant with recent discoveries bearing on the origin and antiquity of the human race.

With regard to the subject-matter of Part II. I have to offer a few explanatory remarks. The Terramara Settlements of the Po Valley had so greatly interested me, some twenty-five years ago, that I wrote a pretty full account of their unique remains for my *Lake-dwellings of Europe*, classifying them as an offshoot of the adjacent Lacustrine Palafittes. That I gave a fair account of the terramara researches, and of the different theories then held with regard to their origin and purpose, there is ample evidence in the reviews of my book which appeared at the time. But there is one notice, written as late as 1907, which shows that after an interval of seventeen years my observations were not superseded by any other

v

more general work. M. Salomon Rheinach, one of the most distinguished of living archæologists, in a preface to M. Modestov's book—*Introduction à l'Histoire romaine*—writes: "Il n'y a qu'un livre récent sur les stations lacustres et les terramares de l'Italie; il a été écrit en Anglais par un Ecossais."

But since the publication of my book in 1890, further researches have disclosed new features in the structure of the terramara mounds of Emilia which have greatly added to their archæological importance. My object in again recurring to the subject is to bring the history of terramara investigations up to date; and further to inquire if there exist analogous remains elsewhere in Europe.

The special object of the Munro Lectureship is to popularise prehistoric methods of research, and to stimulate the inquiring faculties of intelligent persons to pursue the subject on account of its inherent interest to the civilised races of the present day. While there is, therefore, no effort in the present course to exhaust the evidential materials of the two departments here discussed, they are, nevertheless, drawn upon with sufficient fullness to give a fair summary of the facts. To facilitate further studies, copious references are given to the works of authorities on the respective subjects—a *modus operandi* so essential for the elucidation of the Terremare and Lacustrine Palafittes, that a bibliography of their scattered literature had to be compiled, so as to afford easy references by numbers.

It would be impossible to give a popular account of researches conducted in so many different localities without utilising, to a large extent, the voluminous literature and illustrations already published. I have, therefore, the greatest pleasure in expressing my sincere thanks to so many anthropologists and archæologists who have given me permission to copy illustrations from their published works and special monographs. These are so many that I find it difficult to

reduce their number to a list of reasonable length. But this is less necessary, as I have acknowledged throughout the text every extract and every illustration used in this work, whether copied by photography or redrawn in a size to suit my pages. On this score I must, however, make one or two exceptions which only illustrate the invariable courtesy and generosity with which my applications were received. Foreseeing that I would have to make an unusual demand on the special monographs of Cartailhac and Breuil on the more recently discovered wall-paintings in the caves of Altamira, Niaux, etc., I wrote to these gentlemen, as well as to the editor of *L'Anthropologie*, explaining the character of the work I was engaged in, and asking permission to copy some of their illustrations. Not only was my request courteously granted, but M. Cartailhac offered to send me the original plates. Dr Henri Martin made a similar proposal with regard to the La Quina human skeleton. I have not, however, availed myself of such kindnesses, as the illustrations were not often suitable for the size of my pages. Moreover, when I was delivering the lectures, I received from M. Cartailhac a large assortment of coloured drawings of the animals depicted on the walls of Altamira, just in time to be exhibited to an astonished audience.

Among current publications which have furnished me with much valuable materials, as will be seen from the frequent references made to them in the text, I have specially to mention the following :—

L'Anthropologie, edited by M. Boule.

Bulletins de la Société d'Anthropologie de Paris.

Revue Mensuelle de l'Ecole d'Anthropologie de Paris.

Bullettino di Paletnologia Italiana.

Congrès International d'Anthropologie et d'Archéologie Préhistoriques.

I am indebted to the Councils of the following Societies for a number of *clichés*, viz. : Geological Society of London

(Figs. 22 and 23); Royal Anthropological Institute (Figs. 127-146 and 159-164); and Society of Antiquaries of Scotland (Figs. 110-117).

I have to thank my niece, Miss Dona Munro, for having typewritten the lectures before they were delivered, and for reading the proofs as they were passing through the press.

To the publishers I owe much for the care and precision with which they have carried out their part of the work.

In conclusion, I have to state that Part II. practically formed the DALRYMPLE LECTURES ON ARCHÆOLOGY which I had the honour of delivering last year in the University of Glasgow.

ELMBANK, LARGS,

July 1912.

CONTENTS

PART I.—ANTHROPOLOGY

PALÆOLITHIC MAN IN EUROPE, WITH SUPPLEMENTARY CHAPTER ON THE TRANSITION PERIOD

CHAPTER I

MAN'S PLACE IN THE ORGANIC WORLD

Introductory—Descent from Fossil Ancestors—Degeneration—Correspondence between the Senses and the Environment—The Line of Man's Ascent—Embryology—Man and the Anthropoid Apes—A Retrospect—Man's Career a New Departure—Erect Posture—Cranial Development—Two Lines of Investigation—Prognathism—Biblical account of Creation

Pages 3-25

CHAPTER II

MAN AND GLACIAL PHENOMENA

Great Ice Age—Stone Implements—Fauna—Inhabited Caves—Classification of Materials—*Chelléen*, *Acheuléen*, *Moustérien*, *Aurignacien*, *Solutréen*, and *Magdalénien* Epochs Pages 26-54

CHAPTER III

CAVE RESEARCHES (BRITAIN)

Methods of Investigation—Authenticity of Objects—Kent's Cavern—Windmill Hill Cavern—Cresswell Caves—Hyæna Den of Kirkdale—West of England and Welsh Caves—The Paviland Cave and Human Skeleton—Other Gower Caves—Wookey Hole Pages 55-67

CHAPTER IV

CHRONOLOGICAL PROBLEMS AND LAND OSCILLATIONS

Introductory—Station of Veyrier—Cave of Béthenas—Cavern of Freudenthal—Kesslerloch Cave—Schussenried Open-air Station—Schweizersbild—Land Oscillations—Hoxne Brick-earth—General remarks Pages 68-87

CONTENTS

CHAPTER V

FOSSIL MAN (EARLY RECORDS)

Fossil Man defined—Missing Links—Early Records—Cave of Bise—Schmerling's Researches—Lahr Skeleton—Fossil Man of Denise—Arcy-sur-Cure Jaw—Neanderthal Skull—Lyell's *Antiquity of Man*—Origin of Species—Virchow on Canstadt and Neanderthal Skulls—Smeermass Jaw—Moulin-Quignon Jaw Pages 88-104

CHAPTER VI

FOSSIL MAN (BRITAIN AND BELGIUM)

1. *Discoveries in Britain*.—Man Contemporary with Irish Elk in Ireland—Skeleton of Tilbury—Skull at Bury St Edmunds—Galley Hill Skeleton.
2. *Discoveries in Belgium*.—Trou de la Naulette—Trou du Frontal—Cavern of Goyet, Trou Magrite, etc.—*Les Hommes de Spy* Pages 105-126

CHAPTER VII

FOSSIL MAN (FRANCE)

The Valley of the Vézère—The Cro-Magnon Skeletons—*L'Homme écrasé de Laugerie Basse*—Skeleton of Chancelade—*Homo Mousteriensis Hauseri*—*Homo Aurignacensis Hauseri*—Skeleton of Chapelle-aux-Saints—Fossil Man of Ferrassie—Skeletons of Grenelle and Clichy—*Race de la Truchère*—Jaw of Malarnaud—Skulls of Marcilly-sur-Eure and Bréchamps—Cemetery of Duruthy—Human Jaws of Petit-Puymoyen—Skull of Placard—Skeleton of Hoteaux—Skeleton of Moustier-de-Peyzac—The Skeleton of La Quina Pages 127-158

CHAPTER VIII

FOSSIL MAN (ITALY AND OTHER COUNTRIES)

The Caves of Grimaldi—Olmo Skull—Eguisheim Skull—Brüx Skeleton—Brünn Skeleton—Cemetery of Predmost—Skull of Podbaba—Skull from Fürst Johanns Höle—Sipka Jaw—Human Remains at Krapina—*Homo Heidelbergensis*—Gibraltar Skull—Pleistocene Man in Jersey Pages 159-183

CHAPTER IX

PITHECANTHROPUS ERECTUS

Descriptive details—Dubois on his Critics—G. de Mortillet on Dubois' Critics—The Java Remains considered from a Wider Standpoint than that of Pure Anatomy Pages 184-195

CHAPTER X

THE PALÆOLITHIC RACES OF EUROPE: THEIR CULTURE
AND CIVILISATION

1. *Palæolithic Races of Europe*.—(1) *Homo Heidelbergensis*; (2) Neanderthal-Spy Race; (3) Magdalénien Race; (4) Cro-Magnon Race; (5) *Race de Grimaldi*.
2. *Evolution of Arts and Industries*.—Wall Pictures—The Sculptured Rocks of Cap-Blanc—Human Representations—Concluding remarks . . . Pages 196-240

CHAPTER XI

ON THE TRANSITION BETWEEN THE PALÆOLITHIC AND
NEOLITHIC CIVILISATIONS IN EUROPE

The *Hiatus* Problem—The Evidence—(1) The Cavern of Mas-d'Azil; (2) *La Grotte de Reilhac*; (3) The Bone Caves of Ojcow; (4) Cave of Ofnet; (5) The MacArthur Cave; (6) Early Man in the Forth Valley; (7) The Rock-shelter of Druimvargie; (8) Shell-heaps on Oronsay; (9) Shell-heap on Inchkeith; (10) Sporadic Finds of Harpoons in Britain; (11) Distribution of Neolithic Harpoons; (12) Rock-shelter of Schweizersbild; (13) Moulin des Liesberg and Bellerive; (14) Hut-dwellings at Campigny; (15) Tardenoisien Flint Industry; (16) A Floating Lacustrine Station; (17) Danish Kjökkenmöddings; (18) Shell-heaps in Portugal; (19) General conclusions Pages 241-287

PART II.—PREHISTORIC ARCHÆOLOGY

TERREMARE, AND THEIR RELATION TO LACUSTRINE
PILE-STRUCTURES

CHAPTER XII

THE DISCOVERY AND STRUCTURE OF THE TERREMARE

Introductory—Early Opinions on the Terremare—Report of Strobel and Pigorini—New School of Archæology—Special Investigations at Castione—Castellazzo de Fontanellato—Rovere di Caorso—Montata dell' Orto—Characteristics of a Typical Terramara Pages 291-320

CHAPTER XIII

CULTURE AND CIVILISATION OF THE TERRAMARICOLI

Introductory—Montale—Gorzano—Casale Zaffanella and other Stations north of the Po—Castellaccio—Lacustrine Station of Offida—Terramara at Taranto—General remarks on the Terramara Settlements . . . Pages 321-345

CHAPTER XIV

LACUSTRINE PILE-STRUCTURES IN THE PO VALLEY

Introductory—Lake Varese—Turbaries of Biandrono, Cazzago-Brabbia, and Pustenga—Lake Varano and L. Ternate—Turbaries of Mombello, Vulcuvia, and Brenno—Lakes Lecco, Annone, and Pusiano—Turbaries of Bosisio, Capriano, Maggiolino, Mercurago, Borgo-Ticino, San Martino, Lagozza, Lagazzi, Iseo, and Polada—Lake Garda—Turbary of Cascina—Lake Fimon—Fòntega—Arquà Petrarca Pages 346-397

CHAPTER XV

RELATION BETWEEN THE TERRAMARICOLI AND THE
NEOLITHIC HUT-DWELLERS

Introductory—Hut-dwellings in the Po Valley—Mixed Stations in the Vicinity of Bologna, Imola, the Marche, and South Italy—Burial Customs of the Terramaricoli and of the Western Lake-dwellers—The Racial Problem
Pages 398-429

CHAPTER XVI

STRUCTURES ANALOGOUS TO TERREMARE IN OTHER
EUROPEAN COUNTRIES

Introductory—Terpen of Holland—Warfen and Wurthen—Pile-structures in Hungary—The Neolithic Station of Butmir—Pile-structure at Ripac—The Pfahlbau of Donja Dolina—Concluding remarks Pages 430-476

BIBLIOGRAPHY OF LAKE-DWELLING AND TERRAMARA RESEARCHES IN
ITALY Pages 477-487

INDEX Pages 489-508

LIST OF ILLUSTRATIONS

FULL-PAGE PLATES

| PLATE | FACE PAGE |
|--|----------------------------|
| Double-handed Saws from Polada. (From photo by Rambotti) | <i>Frontispiece</i> |
| I. Flint Implement (Coup-de-poing) found in Gray's Inn Lane, from British Museum Catalogue of the Stone Age | 39 |
| II. Flint Implements (Coups-de-poing) from different Countries | <i>between 40 and 41</i> |
| III. Flint Implements from the Upper Gravels of Saint Acheul. (After Commont). | <i>between 40 and 41</i> |
| IV. Flint Implements from "Terre à Briques" in the Somme Valley. (After Commont) | 42 |
| V. Objects illustrating the Aurignacien Epoch. (Chiefly after Breuil) | 48 |
| VI. Objects illustrating the Solutréen Age | 53 |
| VII. Objects illustrating the progressive civilisation of the Palæolithic Cave-dwellers of France | 54 |
| VIII. & IX. Objects illustrating the progressive civilisation of the Palæolithic Cave-dwellers of France | <i>between 56 and 57</i> |
| X. Relics from British Palæolithic Caves | 60 |
| XI. Engraved Figures of Animals and Ornaments from the Kesslerloch Cave. (After Conrad Merk) | 71 |
| XII. Objects from the Kesslerloch Cave. (After Conrad Merk) | 74 |
| XIII. Flint Implements from the Belgian Caverns and the Alluvial Deposits of Mesvin. (<i>C.A.P.</i> , 1872, pl. xxxvii-lxv) | 122 |
| XIV. The Skeleton of La Quina. (From photo by Dr Henri Martin) | 156 |
| XV. Human Skeleton from the Grotte du Cavillon, Mentone. (Photo by Rivière) | 160 |
| XVI. Animals sculptured in Ivory and Horn, from Bruniquel and Laugerie Basse | 209. |
| XVII. Portion of Reindeer-horn sculptured into two Horse-heads | 210 |
| XVIII. Bâton de Montgaudier. (<i>Comptes rendus C.A.P.</i> , 1889, pl. i.) | 212 |
| XIX. Bâtons de Commandement from La Madeleine. (After Lartet and Christy) | 214 |
| A.—Group with Human Figure (<i>Reliq. Aquitanicæ</i> , B., pl. ii.) | |
| B.— <i>Ibid.</i> , B., pl. xxx. | |
| XX. Horse and other objects carved in Ivory and Bone | <i>between 216 and 217</i> |

| PLATE | FACE PAGE |
|--|---------------------|
| XXI. Mammoth engraved on a piece of Ivory from La Madeleine. (<i>Comptes rendus de l'Académie des Sciences</i> , vol. lxi.) between 216 and 217 | |
| XXII. Painted Animals from the Cave of Font-de-Gaume. (After Capitan and Breuil) | 224 |
| XXIII. Figures on the Roof of the Grand Salle of the Cavern of Altamira. (After Cartailhac and Breuil) | 227 |
| XXIV. Two of the Animals figured on Pl. XXIII. Polychrome Paintings of a Deer and Bison. (After Cartailhac and Breuil, <i>L'Anth.</i>) | 229 |
| XXV. A.—Panel on the Grotte de Niaux; B.—A Bovine Animal in Hardened Mud on the Floor of Niaux | between 232 and 233 |
| XXVI. View of the Rock-shelter of Cap-Blanc. (After Dr Lalanne and Breuil, <i>L'Anth.</i> , 1912) | between 232 and 233 |
| XXVII. Two Panels in the Rock-shelter of Cap-Blanc, with Sculptured Horses. (<i>Ibid.</i>) | 236 |
| XXVIII. Various Figures representing the Human Form | 238 |
| (1) <i>Venus impudica</i> (ivory) from Laugerie Basse (after Cartailhac and Breuil, <i>L'Anth.</i> , 1907). (2 and 3) From Brassempouy (<i>L'Anth.</i>). (4) From Willendorf, made of limestone and covered with red ochre (after Szombathy, <i>Sitz. der Anth. Gesel. in Wien</i> , 1910). (5) Trou Magrite, made of reindeer-horn (after Dupont, <i>Les Temps Préhistoriques en Belgique</i> , p. 92). (6) From Gourdan, made of reindeer-horn (<i>Rev. Préhistorique</i> , 1906). (7) From Mas-d'Azil, engraved on a rondelle of a shoulder-blade (<i>Acad. des Sciences</i> , 1903). (8) Figure of ivory (Brassempouy) (after Piette, <i>L'Anth.</i>). (9) <i>Ibid.</i> (10) Made of steatite (Grottes de Grimaldi). (11) From Laugerie Basse, made of reindeer-horn (after Girod et Messénat, <i>Les Stations de l'Âge du Renne</i> , pl. i., fig. 2). (12) Human head of reindeer-horn from the Grotte de Rochbertier (Charente) (after <i>M. Préhistorique</i> , fig. 199). (13) Human hands engraved on a portion of a dart (La Madeleine): one end shows the slanting edge with <i>marques de chasse</i> ; it is difficult to say what the cuts on the forearm mean. | |
| XXIX. Objects from the Bone Caves of Ojcow. (After Dr Römer) | 258 |
| (1) Perfectly round ivory rod, pointed at both ends and ornamented, use unknown. (2) Flat ivory rod compressed at the sides. (3) Bone tool, nearly round, and perforated with a round hole, numerous cross incisions on the surface. (4) Bone tool. (5) Vessel of burnt clay, with a handle, made by the hand, and without glaze. (6) Pottery roughly ornamented with furrows. (7) Bone needle (fragment). (8) Bone arrow-head. (9) Oval pendant of ivory. (10) Irregularly rectangular plate of bone perforated with two round holes and ornamented with seven rows of circular hollows. (11 and 12) Glass beads, coloured and ornamented. (13) Canine tooth of cave-bear, perforated. (14-17) Flint implements. (18) Perforated bone pointer. (19) Spindle whorl of baked clay. | |

LIST OF ILLUSTRATIONS

XV

| PLATE | FACE PAGE |
|--|-----------|
| XXX. The Sepulture in the Cave of Ofnet | 260 |
| A.—Section of the Deposits. | |
| B.—Showing the arrangement of the Skulls. (After Dr R. R. Schmidt, <i>L'Anth.</i> , 1909.) | |
| XXXI. Hut-dwellings at Campigny, Specimens of Pottery and Flint Implements. (After Salmon, D'Ault du Mesnil, and Capitan, <i>R.E.A.</i> , 1898) | 276 |
| XXXII. A.—Objects from the Danish Kjökkenmöddings. B.—Objects from the Shell-heaps of Portugal | 280 |
| XXXIII. Two views of the Piles and Contrafforte at Castione | 309 |
| XXXIV. Pile-structures in Terremare <i>between 312 and 313</i> | |
| A.—View of Piles <i>in situ</i> in the Terramara of Parma. | |
| B.—View of Piles in one of the Streets of Castellazzo. | |
| XXXV. Objects from Castione and other Terremare in the vicinity of Parma <i>between 312 and 313</i> | |
| XXXVI. Plan of Castellazzo | 314 |
| XXXVII. Relics from Castellazzo | 316 |
| XXXVIII. & XXXIX. Relics from Montale and other Terremare in the Vicinity <i>between 328 and 329</i> | |
| XL. Viadana and Stations on the North of the Po | 330 |
| XLI. Relics from the Terramara of Taranto. (After Quagliati and Pigorini) | 337 |
| XLII. Isola Virginia | 352 |
| Nos. 25 and 29 after Ranchet and Regazzoni (<i>B.</i> , 111), and the rest from Sig. Ponti's Museum on the Isola Virginia. | |
| XLIII. Bodio, Cazzago, and Bardello | 354 |
| Nos. 1, 4-7, 10, 11, 30, 32, and 39, from Museo Civico, Milan; 2 and 3, from Collection Castelfranco; 8, 9, 12, 13, 18, 20-22, 25-29, and 43, from Ponti's Museum; 14, 15, 17, 19, 23, 31, 33-38, 41, and 42, after Regazzoni (<i>B.</i> , 112); 16, 24, and 44 from the Museum at Varese. | |
| XLIV. Objects from Torbiera di Cazzago-Brabbia (except No. 1) | 357 |
| No. 1 (Torbiera di Mombello) and 11 (Bodio Centrale) are from the Museum in Varese; 2, 4-8, after Quaglia (<i>B.</i> , 138, <i>bis</i>); 3, Collection Castelfranco; 9, 14, 15, 17, 19, 23-27, 32, 33, Collection Quaglia; 10, M. Civico, Milan; 12, 13, 16, 20-22, 28 and 29, Collection Regazzoni, Como; 30, 31, 34-36 (<i>B.</i> , 112); 18 (<i>B.</i> , 55). | |
| XLV. Objects from various Turbaries | 358 |
| Nos. 1-7, Collection Castelfranco; 8, 9 and 12, in M. Preistorico, Rome; 10 and 11, M. Civico, Como; 13, 15-19, after Marmoni (<i>B.</i> , 55); 14, M. Civico, Milan; 20-26, after Quaglia (<i>B.</i> , 138, <i>bis</i>); 28-30, after Gastaldi (<i>B.</i> , 97); 31 and 32, after Castelfranco (<i>B.</i> , 195 (<i>a</i>)). | |
| XLVI. Mercurago and other Turbaries in Lombardy. (All after Gastaldi, <i>B.</i> , 4, 59, and 97) | 364 |

LIST OF ILLUSTRATIONS

xvii

| PLATE | FACE PAGE |
|---|---------------------|
| LXX. Relics from Ripac. (After Radimsky) | 469 |
| LXXI. The Pile-structure of Donja Dolina | between 472 and 473 |
| A.—Showing the under-structures of House No. II. | |
| B.—View of Houses IV. and V., with Bridge between, partly restored. (After Truhelka.) | |
| LXXII. Relics from Donja Dolina | between 472 and 473 |
| LXXIII. Various Remains from Donja Dolina | 474 |
| A.—Two Wooden Coffins between Houses III. and IV. | |
| B.—Relics found in Urns. (After Truhelka.) | |
| LXXIV. Specimens of the Ornamentations on Pottery from Donja Dolina, including <i>Anse lunata</i> , Nos. 5, 6, 8, 9. (After Truhelka) | 476 |

LIST OF FIGURES IN THE TEXT.

| FIG. | PAGE |
|--|------|
| 1. Lower Jaw of Spy Skeleton. (After Fraipont, <i>Archives de Biologie</i> , vol. vii., pl. xix.) | 18 |
| 2 & 3. Naulette Jaw. (After E. Dupont, <i>L'Homme pendant les Âges de la Pierre</i> , second ed., p. 100) | 18 |
| 4. Profile of various Mandibles. (After Broca, <i>C.A.P.</i> , 1867, p. 399). | 20 |
| 5. Profile of Lower Jaws. (After Gaudry, <i>ibid.</i> , 1906, vol. ii., p. 374) | 21 |
| 6. Front and Side Views of Skull of a Native Australian. (After Owen, <i>Owen's Comparative Anatomy</i> , vol. ii., p. 558) | 22 |
| 7. Skull of a well-formed European. (<i>Ibid.</i> , p. 560) | 22 |
| 8 & 9. Neanderthal Skull. (After Huxley, <i>Collected Essays</i> , vol. vii., p. 180) | 23 |
| 10. Section across the Valley of the Ouse. (Lyell's <i>Antiquity of Man</i> , p. 164) | 31 |
| 11. Molar Teeth of Elephants. (After A. de Mortillet, <i>Musée Préhistorique</i> , pl. xv.) | 41 |
| 12. Section of Gravels at Saint Acheul. (After Cammont, <i>R.E.A.</i> , 1907, p. 16) | 45 |
| 13. A Plaque of Schist, with Incised Rhinoceros. (After Breuil, <i>ibid.</i> , 1906, p. 244) | 49 |
| 14. Bone Tubes or Flasks for carrying Ochre. (After Breuil, <i>ibid.</i> , p. 52) | 50 |
| 15. Objects found at Veyrier. (After Thioly, <i>Revue Savoisienne</i> , 1868) | 70 |
| 16. Skull found in the Cave of Béthenas. (After Jarricot, <i>Bull. de la Soc. d'Anth. de Paris</i> , 1902, pp. 103-139) | 71 |
| 17. Engis Skull. Side View | 92 |
| 18. Engis Skull. Top View. (After Huxley, <i>Man's Place in Nature</i> , chap. iii.) | 92 |
| 19. Outlines of the Mandibles of Moulin-Quignon and Malarnaud. (After Quatrefages, <i>Hommes Sauvages</i> , p. 10, and <i>C.A.P.</i> , 1889, p. 417) | 104 |
| 20. Outline of Human Skull found at Tilbury. (After Owen, <i>Antiquity of Tilbury Man</i> , London, 1884) | 107 |
| 21. Flint Implements from Bury St Edmunds. (After H. Prigg, <i>Jour. Anth. Inst.</i> , vol. xv., p. 54) | 109 |

| FIG. | PAGE |
|--|---------|
| 22. View of Chalk and Gravel Pit at Galley Hill. (<i>Quart. Journ. Geo. Soc.</i> , 1895) | 111 |
| 23. Palæolithic Implements from Galley Hill. (<i>Ibid.</i>) | 112 |
| 24. Side View of Galley Hill Skull. (The last three figures are after E. T. Newton) | 114 |
| 25. Relics of the Mammoth and Reindeer Periods in Belgium. (After Dupont, <i>L'Homme pendant les Âges de la Pierre</i> ; <i>C.A.P.</i> , 1872, pl. 74) | 117 |
| 26. Skulls from Trou du Frontal. (<i>C.A.P.</i> , 1872, pl. 74) | 121 |
| 27. Reconstructed Vase from Trou du Frontal. (After Dupont) | 122 |
| 28. Section of Grotte de Spy. (After Lohest and De Puydt, <i>Comptes rendus du Congrès de Namur</i> (1886)) | 124 |
| 29 & 30. Two Views of the Skull (No. 1) from Grotte de Spy. (After Fraipont, <i>Archives de Biologie</i> , vol. vii.) | 126 |
| 31. Map of the Vézère District. (After M. Peyrony) | 128 |
| 32. Section through the Rock-shelter of Cro-Magnon. (After M. L. Lartet, <i>Reliquiæ Aquitanicæ</i> , p. 67) | 129 |
| 33 & 34. Skull of Old Man of Cro-Magnon. (<i>Ibid.</i> , C., pl. i.) | 131 |
| 35. Section of the Rock-shelter of Laugerie Basse. (<i>Ibid.</i> , p. 257) | 132 |
| 36. Side View of Skull from Laugerie Basse. (<i>Crânia Ethnica</i> , p. 50) | 133 |
| 37. Skull of Chancelade. (After Testut, <i>Recherches Anthropologiques sur le squelette quaternaire de Chancelade</i> , 1889; M. Hardy, <i>C.A.P.</i> , 1889, p. 403) | 133 |
| 38. Section of Rock-shelter of Chancelade. (After M. Hardy, <i>ibid.</i>) | 134 |
| 39. Skull of <i>Homo Mousteriensis</i> Hauseri. (<i>L'Homme Préhistorique</i> , 1909) | 136 |
| 40. Skull of <i>Homo Aurignacensis</i> Hauseri. (<i>Ibid.</i> , p. 341.) Photo by Hauser | 137 |
| 41. Skull of Chapelle-aux-Saints, after restoration by M. Boule. (<i>L'Anthropologie</i> , xix, p. 519) | 138 |
| 42. Section of Duruthy Cave. (<i>Matériaux</i> , 1874, p. 101) | 146 |
| 43. Portion of Human Mandible from Petit-Puymoyen. (After Favraud, <i>R.E.A.</i> , 1908, pp. 46-72) | 148 |
| 44. Skull found in the Cave of Barma Grande. (<i>L'Homme</i> , 1884, p. 187) | 150 |
| 45. The Skull of Placard. (After Maret, <i>C.A.P.</i> , 1889, p. 433) | 150 |
| 46-48. Three Views of the Site of La Quina. (<i>Bull. Soc. Préhistorique Française</i> , 1911; <i>ibid.</i> , 1906, pp. 155 and 189; <i>Bull. Soc. Arch. de la Charente</i> , 1896) | 156-158 |
| 49. Ivory Ornaments, found with Human Skeletons in the Grimaldi Caves. (After Sir A. Evans, <i>Journ. Anth. Institute</i> , 1893, p. 187) | 164 |
| 50 & 51. Skulls from the Grotte des Enfants of the <i>Race de Grimaldi</i> . (After Verneau) | 165 |
| 52. Two Views of the Skull of the Male Skeleton of the Cro-Magnon type, from the Grotte des Enfants. (After Verneau) | 166 |
| 53 & 54. Disc and Idol of Mammoth Tusk. (After Makowsky, <i>Mitt. der Anth. Gesel. in Wien</i> , 1892, p. 73) | 170-171 |
| 55. Side View of the Brünn Skull. (<i>Ibid.</i>) | 171 |

LIST OF ILLUSTRATIONS

xix

| FIG. | PAGE |
|---|---------|
| 56. Cranium from Fürst Johanns Hole. (After Szombathy, <i>C.A.P.</i> , 1900, p. 133) | 175 |
| 57. Section of the Rock-shelter of Krapina. (After G. Kramberger) | 176 |
| 58. Relics found at Krapina. (<i>Mitt. der Anth. Gesel. in Wien</i> , 1901-1905) | 177 |
| 59. Two Views of the Heidelberg Mandibles. (After Schoetensack) | 179 |
| 60. Side and Front Views of Gibraltar Skull. (After Sollas) | 180 |
| 61. Section of the Bone Strata at Trinil | 185 |
| 62. Skull of <i>Pithecanthropus erectus</i> . (After Dubois) | 187 |
| 63. Femur of <i>Pithecanthropus erectus</i> | 188 |
| 64. Profile Outlines of Various Skulls (<i>Pithecanthropus erectus</i> . <i>Eine Menschensliche Ubergangsform aus Java von Eug. Dubois</i> Batavia, 1894) | 189 |
| 65. Sculptured Head of a Horse from Saint-Michel d'Arudy. (After Piette) | 212 |
| 66 & 67. Two Bâtons de Commandement. (After Cartailhac and Breuil, <i>L'Anth.</i> 1907) | 213 |
| 68. Skeleton of a Mammoth found in Siberia in 1799 | 214 |
| 69. Incised Figure of Mammoth in the Cave of Combarelles. (After Capitan and Breuil) | 215 |
| 70. Reindeer incised on Plaque of Schist, known as "Comba de Rennes. (<i>L'Anth.</i> 1607) | 215 |
| 71. Bovidæ incised on Stones from the Rock-shelter of Bruniquel | 216 |
| 72 & 73. Horses on Wall of Grotte de la Mouthe. (After Rivière, <i>Bull. de La Société d'Anth.</i> , 1897, 1899, 1901) | 220-221 |
| 74. Animals on Wall of Combarelles | 222 |
| 75. Engraving of a Horse with supposed Cover (Combarelles). | 222 |
| 76. Reindeer (Combarelles) | 223 |
| 77. Wild Goat | 224 |
| (The last four figures are after Capitan and Breuil, <i>R.E.A.</i> , 1902.) | |
| 78. Plan of the Cavern of Altamira. (After M. Harlé) | 226 |
| 79. Tectiform and Scutiform Figures on the Wall of Altamira. (After Cartailhac and Breuil, <i>L'Anthropologie</i> , tomes xv.-xvi.) | 228 |
| 80. Bison, Altamira. (<i>Ibid.</i>) | 228 |
| 81. Horse from Grotte de Niaux. (After C. and B., <i>L'Anth.</i> , 1908) | 231 |
| 82. Pictographic Inscriptions. (<i>Ibid.</i>) | 232 |
| 83. Large Bison. (<i>Ibid.</i>) | 232 |
| 84. Red Tectiform Signs. (<i>Ibid.</i>) | 233 |
| 85. Bison drawn in Hardened Mud (see pl. xxv., B). (<i>Ibid.</i>) | 233 |
| 86. Sketches of the Human Form. (1) Three Faces (Cave of Marsoulas), <i>L'Anth.</i> 1905; (2) Ape-like Forms (Altamira), <i>ibid.</i> ; (3) Figure of Man with Disproportionate Arm, <i>Les Stations de l'Âge du Renne</i> , pl. xiv. | 238 |
| 87. Fragment of Bone, showing Woman and Reindeer, from Laugerie Basse. (Col. Piette). | 239 |
| 88-93. Bone Implements from Mas-d'Azil. (After Piette, <i>L'Anth.</i> , vols. vi. and vii.) | 250 |

| FIG. | PAGE |
|---|---------|
| 94-97. A Bear's Tooth, a Horn Chisel, a Stone Implement, and a Bone Pin, from Mas-d'Azil. (<i>Ibid.</i>) | 251 |
| 98-101. Harpoons of Stag-horn. (<i>Ibid.</i>) | 251 |
| 102. Pebbles painted with Red Spots. (<i>Ibid.</i>) | 252 |
| 103. Flint Implement with a Polished Cutting Edge. (<i>Ibid.</i>) | 252 |
| 104-109. Four Harpoons made of Horns of Cervidæ, from Grotte de Reilhac. (After Cartailhac and Boule, <i>La Grotte de Reilhac</i> , avec 70 figures, Lyon, 1887) | 255 |
| 110-117. Bone and Horn Implements, from the Caves of Oban. (From <i>Society of Antiquaries of Scotland</i> , vol. xxiv., p. 211) | 262-264 |
| 118. Hammer-axe Head of Stag-horn, found beside a Whale's Skeleton at Meiklewood, near Stirling. (After a drawing by Miss Turner.) This remarkable object is preserved in the Anatomical Museum in Edinburgh University | 265 |
| 119-123. Harpoons from Druimvargie, Caisteal-nan-Gilleann, and Newcastle-upon-Tyne | 267 |
| 124. Bone Harpoon from Victoria Cave. (After Boyd-Dawkins, <i>Cave Hunting</i> , p. 111) | 270 |
| 125. Harpoons of Stag-horn. (1) From the bed of the River Dee; (2) from the Lake-dwelling of Concise (<i>Antiqua</i> , 1886, p. 48, pl. x., fig. 2); (3) from Palude Brabbia (<i>B.</i> , 138, <i>bis</i>) | 271 |
| 126. Harpoon from Lattringen. (Victor Gross, <i>Les Protohelvètes</i> , pl. vi., No. 14) | 272 |
| 127-132. Specimens of Pottery from various Terremare Stations | 297 |
| 133. <i>Anse lunate</i> | 298 |
| 134-139. Bone Objects from the Terremare of Emilia | 299 |
| 140. Discoidal Stone (Campeggine) | 299 |
| 141-144. Bronze Implements from various Terremare | 300-301 |
| 145. Spindle-whorls (Campeggine) | 301 |
| 146. Stone Mould (Castelnuovo) | 302 |
| (Figures 127-146 are from <i>B.</i> , 30.) | |
| 147 & 148. Transverse and Longitudinal Sections of the Ritual Trench at Castellazzo | 312 |
| 149. Plan of Rovere di Caorso. | 315 |
| 150. Longitudinal Section of Ritual Pits at Rovere di Caorso | 316 |
| 151. Plan of Montata dell' Orto | 317 |
| 152-154. Sections at Montata dell' Orto | 318 |
| 155. Plan and Sections of Gorzano. (After Coppi, <i>B.</i> , 70, 88, and 96) | 325 |
| 156. Objects from the Terramara of Taranto. (Quagliati, <i>B.</i> , 186; Pigorini, <i>B.P.</i> , xxvi. (2)) | 337 |
| 157. Distribution of Terremare in Po Valley | 341 |
| 158. Lake Varese and its Lake-dwellings | 348 |
| 159. Section of a Portion of the Pile-structure at Mercurago | 364 |
| 160 & 161. Pottery from Mercurago | 365 |

LIST OF ILLUSTRATIONS

xxi

| FIG. | PAGE |
|---|------|
| 162. Portion of a Canoe from Mercurago | 365 |
| 163 & 164. Wooden Wheels, Mercurago | 366 |
| 165. Fibula and Pincers from Trebbo sei Vie. (<i>B.P.</i> , xxii., p. 252) | 408 |
| 166. Plan of District around Butmir | 453 |
| 167. Plan of Butmir. (After Radimsky) | 454 |
| 168. Supposed Hut-foundations. Nos. 15, 31, and 34, and Pile-holes (<i>d</i>) at Butmir | 456 |
| 169. Plan of the Whole Area excavated at Butmir, showing the supposed Hut-foundations. (After Radimsky) | 460 |
| 170. Section of Hut-foundation and Superimposed Relic-bed at Butmir, showing Strata. (After Radimsky) | 461 |
| 171. Globular Weight of Burnt Clay from Butmir | 463 |
| 172. Plan of the Pfahlbau of Ripac | 465 |
| 173 & 174. Sketch Map and Plan of the Pile-structure at Donja Dolina. (After Truhelka) | 469 |

ABBREVIATIONS

The following are a few of the principal publications referred to in the text in an abbreviated form :—

- | | | | |
|------------------------|---|---|--|
| <i>B.</i> | . | . | Bibliography. |
| <i>B.P.</i> | . | . | Bullettino de Paletnologia Italiana. |
| <i>C.A.P.</i> | . | . | Congrès d'Anthropologie et d'Archéologie Préhistoriques. |
| <i>R.E.A.</i> | . | . | Revue Mensuelle d'Ecole d'Anthropologie de Paris. |
| <i>Not. d. Scavi.</i> | . | . | Notizie degli Scavi di Antichità. |
| <i>L'Anth.</i> | . | . | L'Anthropologie. |
| <i>Matériaux, etc.</i> | . | . | Les Matériaux pour l'Histoire primitive et naturelle de l'Homme. |
| <i>Mon. Ant.</i> | . | . | Monumenti Antichi (Reale Accademia dei Lincei). |
| <i>Zeit. f. Eth.</i> | . | . | Zeitschrift für Ethnologie. |

ERRATA

PAGE 123, 4th line from foot, *for* "Belche," *read* "Betche."

„ 124, 11th line from foot, *for* "*Cervus elephas*," *read* "*Cervus elaphus*."

PART I.—ANTHROPOLOGY

PALÆOLITHIC MAN IN EUROPE, WITH
SUPPLEMENTARY CHAPTER ON
THE TRANSITION PERIOD

CHAPTER I

MAN'S PLACE IN THE ORGANIC WORLD

Introductory. Descent from Fossil Ancestors. Degeneration. Correspondence between the Senses and the Environment. The Line of Man's Ascent. Embryology. Man and the Anthropoid Apes. A Retrospect. Man's Career a New Departure. Erect Posture. Cranial Development. Two Lines of Investigation. Prognathism. Biblical account of Creation.

IN order to form an unbiassed opinion on Man's place in the organic world, it is essential to be more or less conversant with the principles and laws which govern the phenomena of the environment in which he lives, moves, and has his being. So long as human beings were believed to occupy a higher platform in organic life than other animals by virtue of some special creative endowments, no one apparently thought of looking for evidence of their origin and history in the obscure vista of prehistoric times. The long-cherished traditions and myths which had gathered around the inquiry left little room for any other hypothesis than that the apparition of Man on the field of life was the last and crowning achievement of a long series of creative fiats which brought the present world-drama into existence. In the cosmogony thus conjured up the multitudinous phenomena of the material world—animals and plants, the distribution of land and water, the recurrence of the seasons, etc.—were regarded as having been specially designed and arranged to administer to the life-functions of this new being. Nurtured in an environment so full of legendary romance, we need not be surprised to find that the philosophic schools of modern times continued to teach some such theory of Man's origin up to about half a century ago, when the doctrine of organic evolution captured the scientific mind of the day. But, notwithstanding the far-reaching significance of the evolution theory, the evolutionary stages of Man's career on the globe

remained almost as great a mystery as before ; for, at the outset, the new doctrine appeared to go no further than to point to the direction in which the trail of humanity was to be looked for.

In approaching the subject from the standpoint that the origin, history, and civilisation of *Homo sapiens* are not to be determined under a *sui generis* code of transcendentalism, which finds no place among the methods of research applicable to the pursuit of the natural sciences in general, the following general propositions deserve to be carefully pondered as reliable deductions having the imprimatur of some of the most competent biologists and palæontologists of modern times. The object of these preliminary statements is to show that the principles and laws which govern the rest of the organic world, past and present, are equally applicable to Man, and that they are the only legitimate means of gaining any knowledge of the mystery of human existence.

Fossil Ancestors.

That all the higher animals, which form so conspicuous a feature of the animated world of to-day, are genetically connected by descent from common ancestors, may now be accepted as a settled dogma in biology. But the evidence on which this comprehensive generalisation is founded scarcely admits of experimental proof, because these ancestors are no longer in life, owing to the inexorable law which destines every individual organism, after a more or less limited period of existence, to return to the bosom of mother-earth. Hence, of the vast majority of these pre-existing parental organisms no traces are now to be found, so that the only means of knowing anything of their former existence and characteristics is by investigating certain casts or impressions of the bodies of a few individuals which, here and there, by a fortuitous combination of circumstances, have become permanently stereotyped in the crust of the globe. Such fossil remains, however, disclose little more than the outlines of their bodies and some petrified portions of their skeletons ; but yet, in the hands of skilled palæontologists, they have been made to throw a flood of light on the problem now under consideration. To fully comprehend the doctrine

of evolution, one has, therefore, to examine living fauna, not only as regards the resemblances, differences, physical environments, and geographical distribution of the different species, but also to trace their fossil predecessors throughout a long series of geological periods extending from the dawn of life on the globe to the present day. When a common fossil ancestor to two or more present-day species is disinterred, we have to carry our imagination back to the time when it was simply an individual member of a living species, similarly affiliated to pre-existing predecessors. By continuing this line of investigation backwards in time through the successive sedimentary strata which form the larger portion of the earth's crust, we gradually encounter less and less specialised forms, till ultimately the most divergent types meet in a common origin among unicellular organisms, analogous to those still prevalent on the borderland of the animal and vegetable kingdoms, such as the amoeba, red-snow plant, yeast, etc. Now many of these lower organisms exhibit, though in a most rudimentary manner, nearly all the vital phenomena of the higher animals—voluntary motion, assimilation of food, growth and maintenance, reproduction, decay, and death.

It has been demonstrated by the dissection of animals that, however dissimilar in outward form, they are all a congeries of unicellular organisms grouped together on a uniform plan, and working in the animal economy on the principle of the division of labour. Hence the human body may be regarded as a combination of unicellular animals, arranged so as to subordinate their original individualism to the general welfare of the compound organism. In the course of long ages these cell-units have become adapted for their special functions by becoming part of the animal's tissues and framework, or are floating about as corpuscles in its blood and secretions. Thus they build up cellular membrane, muscular fibre, medullary matter, brain cells, etc., by means of which the animal functions, from simple molecular movements up to conscious cerebration, are performed. It may also be observed that, between the unicellular organisms and the higher animals existing in the present day, there are multitudes of intermediate groups more or less differentiated; and so gradual is this differentiation

manifested that the whole series may be compared to a chain having for one of its terminal links a unicellular organism, and for the other, man himself. But yet, all these intermediate links have made an independent existence, without any direct connection with each other, except on the lines of their genetic descent, through which alone their common attributes have been acquired. Another remarkable fact is, that the present-day species are never exactly similar to their fossil ancestors. Hence it follows that some modification in the somatic structure of organisms takes place in the course of time; and it is significant that this modification does not proceed at a uniform rate, nor is it dependent on the time that has elapsed since the latter were in life. For there are some species which have so persistently resisted all evolutionary movements that they continue to flourish through several geological periods without having undergone any material change. For example, the Lamp-shells, King-Crabs, Pearly Nautilus, and many others, have come down from palæozoic times to the present day with comparatively little modification through these millions of years. Indeed, so unprogressive were some of them that they preferred to die out rather than change their antiquated ways. Such animals Professor Cleland very appropriately designates as "terminal forms of life" (*Journal of Anat. and Phys.*, vol. viii., p. 350).

The same remarks apply to many of the Protozoa of the present day, some of which would be undistinguishable from their predecessors in all ages had we the means of making a comparison between them. This idea is so far borne out by the organisms recently dredged up from the bed of the Atlantic—Foraminifera, Sponges, Corals, etc.—many of which have been declared to be similar to analogous forms in chalk. On the other hand, at a much later period than the Cambrian, many genera and species had arisen, flourished for a comparatively short time, and then vanished for ever. Such were the *Ichthyosaurus*, *Plesiosaurus*, *Pterodactyle*, and many other strange forms of swimming and flying reptiles, which became extinct towards the end of the Cretaceous period. The study of the life-history of these extinct animals is most fascinating to all lovers of the marvellous, and most instructive to the

evolutionist. The reconstructed skeleton of the *Diplodocus Carnegii*, a gigantic extinct reptile from the Upper Jurassic Age in North America, and now exhibited in the Natural History Museum, London, is a most striking object-lesson in the records of extinct animal life.

Degeneration.

There is another principle bearing on the variation of both plants and animals, which I cannot do better than introduce to you in the words of Sir Edwin Ray Lankester :—

“Any new set of conditions occurring to an animal which render its food and safety very easily attained, seem to lead, as a rule, to Degeneration ; just as an active healthy man sometimes degenerates when he becomes suddenly possessed of a fortune ; or as Rome degenerated when possessed of the riches of the ancient world. The habit of parasitism clearly acts upon animal organisation in this way. Let the parasitic life once be secured, and away go legs, jaws, eyes and ears : the active, highly-gifted crab, insect, or annelid may become a mere sac, absorbing nourishment and laying eggs.” (*Degeneration*, p. 33, 1880.)

The inference to be deduced from these facts is that the origin, duration, and extinction of species have been largely regulated by circumstances outside the organism itself. Why the Pearly Nautilus should survive to the present day, while those huge terrestrial reptiles which came into existence at a much later period have entirely disappeared, is a problem which cannot be easily answered. Are we to suppose that such monsters as the *Diplodocus*, which measured 84 feet in length and 12 feet 9 inches in height, or the *Atlantosaurus*, which attained a length of over 80 feet and a height of 30 feet, or the huge *Iguanodon*, whose semi-erect skeleton stands 14 feet in height, were not able to hold their own in the struggle for life? Several circumstances in the ever-changing environment might be advanced as adequate causes of their extinction. For instance, the submergence of extensive areas of land, or the appearance on the scene of better equipped competitors, which would either kill them in fight or deprive them of their customary food. That brute strength gives way to cunning and strategy is not a peculiarity of human actions alone. The tiger, seeing the carcase of his prey on which he has just feasted devoured by birds, has no power of retaliating on the

thieves, because his superior strength cannot be brought into action against his aerial foes, but the *Diplodocus* would be as helpless as a sheep against his carnivorous rapacity. The great Irish elk is said to have become extinct in consequence of the excessive development of the antlers, which ultimately became so heavy, that when the animal stumbled into a bog he could not extricate himself.

Correspondence between the Senses and Environment.

There is one other line of thought to which I should like to direct attention, and that is, the correspondence which exists between the senses and certain phenomena in the environment. Animals, as you are aware, keep up their connection with the external world by means of five senses, which are not inappropriately designated the five gateways of knowledge. The mechanism through which these different senses perform their function, consists of more or less elaborately constructed organs—the degree of elaboration being generally proportionate to the position of the species in the scale of development—ranging from the merest grouping of a few nerve-cells up to the complex structure of the brain and nervous system of the higher vertebrates. Now, what I wish to point out more particularly is, that these different senses have extremely well-defined counterparts in the environment, such as light, atmospheric undulations, and certain physical and chemical properties of matter, so that each sensory apparatus has a special excitant in the external world to which it responds. The natural phenomena to which the senses are thus so remarkably correlated may be regarded as constant quantities in nature, and hence they produce cumulative effects on living organisms susceptible to improvement or advance in life. The subject presents an ideal field for the action of natural selection as defined by Mr Darwin. Among the lower animals there is great irregularity in the degree of development of the senses, some having no localised organs, and others only rudimentary ones. The majority of molluscs are endowed with the sense of smell, and some land-shells are guided to their food by taste as well. The cephalopods and gastropods are furnished with visual organs, while most of the bivalves

are without them. The same arguments apply to many of the mechanical contrivances by means of which animals have accommodated themselves to their physical surroundings. Locomotion by land, air, or water was primarily effected in each case by the adjustment of small increments of variation extending over long periods of time ; so that the teleological argument for design in nature resolves itself into the slow process of imperceptible changes in the environment, the effect of which may ultimately produce a variation of species.

The Line of Man's Ascent.

The result of the above brief survey of some of the laws and phenomena of organic life, past and present, is to show that while the vast majority of living things have not risen high up in the scale of evolution—some remaining for ages on a comparatively low plane, or even degenerating, and others becoming for ever extinct—there are a few which have made extraordinary advances, both as regards differentiation of parts and specialisation in function. That the chronological sequence of animal development in bygone ages was from the less to the more highly specialised, will be apparent by a glance at a table of the stratified rocks containing typical fossil remains. Starting with the Palæozoic period, and passing in succession through the more recent strata of the earth's crust, we find the following sequence in the appearance of the Vertebrata—Fishes, Reptiles, Birds, Mammals, and last of all, *Hominidæ*. That is to say, that during the Cambrian period only invertebrate animals flourished ; in the Devonian, the previous animal life was increased by the addition of fishes ; in the Lower Mesozoic, reptiles for the first time appeared on the scene ; but not till the Cretaceous period have we evidence of the existence of birds and mammals. Finally, Man, the most highly differentiated of all animals, made his début among the inhabitants of the globe, an event which probably took place towards the close of the Tertiaries.

Embryology.

The above chronological sequence in the development of animal life has a remarkable parallelism in the phenomenon of

embryology, a fact which to my mind is a striking proof of the truth of the evolution theory. In embryology the starting-point in the development of the animal is the ovum, which is virtually a living unicellular organism. Although almost microscopic in dimensions, the ovum carries with it the fundamental elements of heredity, and moulds the subsequent nutrition of the embryo to such an extent that the features, and many characteristic traits of the parents, are reproduced in the adult life of the new being. So complete is the parallelism between the progressive changes which take place during foetal life, and the gradual development of animals into the higher stages of existence, that Haeckel and Von Baer formulated the theory that the development of the individual is a recapitulation of the race to which he belongs. The meaning of this, when applied to man, is that in his embryological stage we have presented to us in the short space of nine months the successive phases of his entire career on the globe since he first emerged from his protozoan swaddling-clothes. Moreover, during adult life he carries with him some traces of his ancestral condition in the form of the vestigial, or so-called rudimentary organs, such as canine teeth, the coccyx, the inter- and supra-condyloid foramina of the humerus, the appendix vermiformis, remnants of certain muscles, etc., which are apparently useless in the human economy; but their homologues in other animals have special functions assigned to them. What pregnant truths are embodied in the following remarks by Professor Huxley:—

“He (the investigator) also discovers rudimentary teeth, which are never used, in the gums of the young calf and in those of the foetal whale: insects which never bite have rudimentary jaws, and others which never fly have rudimentary wings: naturally blind creatures have rudimentary eyes; and the halt have rudimentary limbs. So, again, no animal or plant puts on its perfect form at once, but all have to start from the same point, however various the course which each has to pursue. Not only men and horses, and cats and dogs, lobsters and beetles, periwinkles and mussels, but even the very sponges and animalcules, commence their existence under forms which are essentially undistinguishable, and this is true of all the infinite variety of plants. Nay, more, all living beings march side by side along the high road of development, and separate the later the more like they are; like people leaving church, who all go down the aisle, but having reached the door, some turn into the parsonage, others go down the village, and others part only in the next parish. A man in his development runs for a little while parallel with, though never passing

through, the form of the meanest worm, then travels for a space beside the fish, then journeys along with the bird and the reptile for his fellow-travellers; and only at last, after a brief companionship with the highest of the four-footed and four-handed world, rises into the dignity of pure manhood." (*Collected Essays*, vol. xi., p. 5.)

Man and Anthropoid Apes.

I will not further speculate on the line of man's ascent, more than to say that among living animals, the orang, the chimpanzee, and the gorilla are the nearest to him both in somatic structure and mental endowments. It would, however, be contrary to all the known facts of evolution to suppose that man has sprung from any of these animals. But, on the other hand, there can be little doubt that, were we able to trace his pedigree far back enough, we would encounter a species which was a common ancestor to him and one or more of the anthropoid apes. But although we are not direct descendants of them, it cannot be denied that they are our first cousins. The morphological difference between man and his nearest of kin is comparatively small; but yet his mental capacity is so far above all other animals now living that many thoughtful men deny the possibility of bridging over the gap by any biological phenomena whatever. On this question the late Dr Allen Thomson, in a lecture delivered in the City Hall, Glasgow, in February 1877, expressed himself as follows:—

"I by no means wish to be understood to contend that our knowledge, either by nervous phenomena or of the structure of nervous organs, is yet such as to warrant dogmatic assertion of an indissoluble and direct relation between organisation and mind; but I venture to affirm that, if we deal with this problem in the same manner as with other scientific investigations, we cannot arrive at any other conclusion than that mental processes, however complicated they become in their higher forms, have taken their first origin in nervous action resulting from the vital activity of nervous structure, and that their rise into higher and higher forms of psychical phenomena is only a fuller development and closer combination of repeated and more complicated nervous action. . . . We do not know nerve force as distinct from the nervous fibre. We have good reason to believe that by some modification of that force in its passage through the nerve-cell, an afferent nervous impression is converted into an efferent impulse in the phenomena of reflex action. And it does no violence to our power of conception to extend the same view to the more complex mechanism situated within the cerebral ganglia, by which all these motions which we style automatic appear to be regulated without the co-operation or control of will or intelligence. When, however, the same afferent impression, which causes a simple reflex or a more complicated automatic motion, reaches the higher part

of the brain and results in sensation or perception, what grounds have we, on any physiological or scientific principle, for asserting that the change which follows is other than a higher manifestation of some nervous property?" (*Structure and Development of the Brain*, W. Collins, Sons & Co., 1879.)

If the above be a correct statement of the facts, and I believe it is, it follows that the brain is the medium or laboratory in which thoughtful reasoning and the higher mental phenomena are generated. As a corollary to this important deduction we expect the amount and quality of mental activities to be proportionate to the size of the cerebral organ. There is some latent truth in this idea, but in drawing definite conclusions of this nature from the actual bulk of brain substance there are some modifying influences to be considered. The actual bulk of an elephant's brain is about three times that of man. In making comparisons of this kind we must consider the relative size of the brain to the animal's body, and, above all, the quality of the brain cells, and no doubt many other factors. But for the present purpose we have only to deal with the brains of the anthropoid apes, and compare them with that of man. On this point Dr Thomson thus writes:—

"The brains of the Anthropoid Apes, the Gorilla, the Chimpanzee, and Orang, all of which have now been well described by competent authors, are far inferior to that of man in the dimensions. Even in the Gorilla, which is most similar in stature to man, the brain does not attain more than a third of the weight of the average human brain, and in the Chimpanzee and Orang it does not even reach a fourth; and thus in these animals the proportion of the weight of the brain to that of the whole body may be as 1 to 100, or even lower, while the proportion in man is from 1 to 40 to 1 to 50." (*Loc. cit.*, p. 31.)

So far, we have included man in our observations on animal life, but now we come to the parting of their ways.

The real problem which now confronts us is to account for the existence of man's large brain under the influence of existing cosmic forces. But before propounding any solution of the problem, it is advisable to bring into focus the discursive observations which I have laid before you, so that you may better realise where we are and what we are driving at.

Retrospect.

Glancing through the æons that have rolled past since life began on the globe, we have seen how myriads of generations

of all sorts of animals and plants have come into existence, flourished for a time, propagated their kind, and then vanished for ever. Glimpses of these evanescent life-panoramas show streams of varied beings arranged into groups or species, and each group possessing characters admirably adapted for making the best use of certain conditions in their respective environments. Some were provided with special organs for attack and defence. Birds and insects had their bodies transformed into flying machines, not, however, always on the same plan. For example, the *Pterodactyle* had its fore limbs modified so as to be used partly as prehensile organs and partly as wings. It has three of the fingers on each limb free and furnished with claws, while the fourth was enormously elongated, in order to support the outer edge of a sail-like membrane, which, on the inner side, was attached to the arm, body, hind limb, and tail. On the other hand, the *Archæopterix*, though differing very much from the birds of the present day, had large feathers on its wings and tail, and its feet were similar to those of modern perching birds. Again, some air-breathers, such as whales and seals, reverted to an aquatic life; and their limbs, which were originally adapted for locomotion on land, were converted into paddle-like flappers for propulsion in water. But, with respect to the air-breathing organ a remarkable fact is to be noted. Although these animals were actually descendants of aquatic ancestors possessed of gills, it was entirely beyond the power of nature to retrace her own evolutionary steps and restore them their lost gills. And hence, these animals have had ever since to come to the surface at stated intervals to breathe. Animals when they become stereotyped on defined lines have not the power of reconsidering their position by way of retracing their steps. They are impelled, as it were, by a *vis a tergo*, to pursue their course on the selected path, subject only to modifications possible within the lines adopted. For example, no conceivable morphological change in the structure of the foot of a horse could improve it as a means of locomotion, on the plan by which the animal has achieved its special position in the organic world, *i.e.*, by gradually lengthening the bones of one of the original five toes, and dispensing with the others. If hard pressed and beaten in swiftness, extinction would be its fate,

unless it resorted to some other effective means of escape. Hence the horse is a doomed "terminal form of life" which without the protection of man would have been already extinct; and once an animal becomes extinct it never again appears on the scene of life. Some animals find security by flying; others by burrowing in the earth; and others by climbing trees. Some fight the battle of life with sharp claws; others with sharp-pointed teeth. Even an elongated neck, or a protruding nose, may be the straw which turns the scale in favour of the particular mode of living the animal has selected, or which has been forced on him. Indeed, there is scarcely a physical, chemical, mechanical, protective, or aggressive principle invented by man which has not been already utilised in the armoury of organic life.

Man's Career a New Departure.

But man's advance was not based on any of the principles or contrivances hitherto adopted in the laboratory of the organic world. His career as *Homo sapiens* is absolutely a new departure in the history of organic evolution. We have already emphasised the fact that his superiority over other animals is due to his acquisition of higher mental endowments. I do not, however, assert that man has a monopoly of the reasoning faculty—except perhaps in dealing with abstract ideas—and that he alone can draw and anticipate logical conclusions from a combination of physical phenomena of daily occurrence, for many animals can do this. They have learned by experience to interpret to a certain extent the ordinary phenomena of the external world, and to conform to their behests. But animal intelligence, whether instinctive, *i.e.*, hereditarily acquired, or suddenly inspired by current phenomena, is altogether on a more limited scale than that of man; and its manifestations are very much alike, seldom going beyond the power of recognising what is beneficial or injurious to the self-preservation of the individual. This limitation in the mental capacity of the lower animals is determined by the uniformity of cause and effect in the material world, the interpretation of which involves no higher reasoning than simple obedience to physical laws. But in the case of man a new element is superadded. Man is not

content with the supply of fruits which he gathers from the garden of nature, nor with the precariousness of the showers of heaven which water them. He plants his own vineyards, and waters them when necessary. He is not satisfied by merely hunting his prey, like carnivorous animals, but has invented a far-reaching plan of domesticating certain animals, on which he can feast at leisure without waste of material. He not only recognises the physical cause of a given effect in his environment, but often adjusts the cause so as to produce the effect at will. Instead of being entirely controlled by nature, he to a considerable extent controls the operations of nature by taking means to counteract them.

Erect Posture.

In the address which I had the honour of delivering in 1893, as President of the Anthropological Section of the British Association for that year, I advocated the hypothesis that the origin of the higher mental manifestations of man was primarily due to the attainment of the erect attitude, which, by entirely relieving the fore limbs of their primary function as locomotive organs, afforded him the opportunity of entering on a new phase of existence, in which intelligence and mechanical skill became henceforth the governing factors. With the completion of the morphological changes involved in the attainment of this attitude, the evolution of the present human form, with the exception of some remarkable modifications in the skull and facial bones which will shortly be described, was practically completed.¹

As soon as bipedal locomotion became habitual and firmly secured on an anatomical basis, it does not appear that the osseous characters of the lower limbs would be sensibly affected by any subsequent increase in the quantity or quality

¹ It is unnecessary here to dwell on the anatomical alterations brought about in the human body in consequence of the attainment of the erect attitude, especially in the fore and hind limbs, which ended by converting the former into true hands, and the latter into organs for bipedal locomotion, as the details may be found in many of the publications on human anatomy. Besides my own address above referred to (republished in *Prehistoric Problems*, chap. ii.), I would refer readers to Professor Goodsir's lectures on the Dignity of Man, and especially to Sir W. Turner's address as President of the Anthropological Section of the British Association for 1897.

of the brain-matter. The function of the femurs being henceforth to support a certain load, *i.e.* the entire weight of the body, it would not influence them in the least whether that load contained the brains of a fool or of a philosopher. The important and novel element which the permanent assumption of the erect posture was the means of introducing on the field of human life, was the use to which the fore limbs were put. The result was the formation of the human hand, the most perfect mechanical organ nature has yet produced. The fingers can be opposed singly or in groups to the thumb, so as to form a hook, clasp, or pair of pincers; and the palm can be made into a cup-shaped hollow capable of grasping a round ball. Nor is there any limit to the direction in which many of these manipulations can be formed without any movement of the rest of the body. The position of such a perfect piece of mechanism at the extremity of a movable arm attached to the upper part of the trunk, gives to man a superiority in attack and defence over all other animals, on the same principle as a soldier finds it advantageous to fight from higher ground. Moreover, he possesses the power to perform a variety of quick movements, and to assume attitudes and positions eminently adapted for the exercise of that manipulative skill with which he countervails the superior brute force of many of his antagonists. He can readily balance his body on one or both legs, can turn on his heels as if they were pivots, and can prostrate himself comfortably in the prone or supine positions. As the centre of gravity of the whole body is nearly in line with the spinal axis, stable equilibrium is easily maintained by the lumbar muscles. Altogether, we have in his physical structure a combination of organs and functions sufficiently unique to place man in a category by himself. But at the same time, we must not forget that his morphological peculiarities have been accomplished without the destruction of the primary and typical homologies common to all the higher vertebrates.

Thus, with bipedal locomotion, the spinal adjustment for maintaining the erect attitude, handicraft skill, and a progressive brain, *Homo sapiens* started on his human career—a career which was destined to give him the title of “Lord of Creation.”

By substituting for nature's means of defence and self-preservation a variety of implements, weapons, and tools made with their own hands, the subsequent well-being of these novel bipeds became dependent on their ability to interpret and utilise the laws and forces of nature. As time progressed they began to recognise the value of the faculty of reasoning as the source of inventive skill; and hence a premium was put on useful inventions. In this way, stimulants to the production of new ideas and mechanical discoveries were constantly coming within the scope of their daily avocations, the outcome of which was a steady increase of human intelligence, and consequently of brain substance. Now, according to the well-established doctrine of the localisation of brain function, the additional brain molecules and cells thus acquired had their seat of growth somewhere in the cerebral hemispheres, which lie well within the anterior portion of the brain-casing. The mere mechanical effect of this increment to the physical organ of thought would be to increase the weight of the anterior half of the head, and so upset its finely poised position on the top of the spinal column. But as any interference with the free and easy rotary movements of the head would be disadvantageous to the individual in the struggle for existence, it became necessary to counteract the influence of this disturbing element by some other concurrent morphological process which would not be prejudicial to the general well-being of the human economy. This object was partly secured by a retrocession, or contraction, of the facial bones, especially of the jawbones, towards the central axis of the spinal column, and partly by a backward shifting of the cerebrum over the cerebellum. As the gradual filling up of the cranial cavity progressed *pari passu* with these cranial modifications, we have in the facial angle of Camper, a rough but ready mechanical means of estimating the progress of mental development during the successive stages of man's existence since he attained the erect attitude.

Cranial Development.

One of the results of this retrocession of the facial bones was the gradual contraction of the alveolar borders of the jaws, thereby diminishing the space allotted to the teeth—a fact

which plausibly accounts for some of the peculiarities which differentiate the older fossil jaws from modern specimens. Thus,



FIG. 1.—Tracing showing size of Teeth in the lower jaw of Spy Skull ($\frac{2}{3}$).
(After Fraipont.)



FIG. 2.—Naulette Jaw—side view ($\frac{1}{2}$). (After M. Dupont.)



FIG. 3.—Naulette Jaw—view from above ($\frac{1}{2}$). (After M. Dupont.)

in the dentition of the former, the third or last molar is the largest, whereas in the latter it is the smallest. This feature is

well shown in some famous human mandibles which undoubtedly belonged to individuals of the oldest palæolithic race hitherto known in Europe, as, for example, those of Spy and Naulette (Figs. 1 and 3). Not only so, but among neolithic and some European races of the present day these back molars, or wisdom teeth, make their appearance at a later date in the individual's life than in the earlier races, so that they seem to be on the high way to become vestigial organs. The lessening of the dental portion of the jaws Mr Darwin attributed to "civilised men habitually feeding on soft cooked food, and thus using their jaws less."

Another peculiarity of civilised races is the greater prominence of the chin, a feature which may also be a result of the retrocession of the facial bones, as the shortening of the alveolar ridges would cause the teeth to assume a more upright setting in their sockets. But whatever the precise cause may have been, there can be no doubt that the gradual formation of the chin has a striking parallelism with the progressive stages of man's intellectual development ever since he diverged from the common stem line from which he and the anthropoid apes have descended. In support of this view the eminent French anthropologist, Paul Broca, exhibited a drawing at a meeting of the International Congress of Anthropology and Prehistoric Archæology, held in Paris as early as 1867 (*Comptes rendus*, p. 399), which shows sectional examples of the chin of a chimpanzee and of various races found in prehistoric deposits, in comparison with that of a modern Parisian (Fig. 4). Also, Professor Albert Gaudry, at a subsequent meeting of the same congress, held at Monaco in 1906, exhibited the annexed sketch (Fig. 5) (*ibid.*, vol. ii., p. 374), showing the comparative development of the chin of a modern Frenchman, of a young man of the *Race de Grimaldi* found in one of the caves of Mentone, and of a fossil monkey (*Dryopithecus*). A careful study of these illustrations cannot fail to be of the highest interest to all students of human anthropology. Since Paul Broca's time a number of other human mandibles have been discovered, corroborating the above concurrent parallelism between the evolution of the chin and the orthognathism of modern civilised races. (See Figs. 39, 41, 59.)

Two Special Lines of Investigation.

It will be seen from what has already been said, that there are two distinct lines on which investigations into the past history of mankind may be profitably conducted, both of which were contingent on the attainment of the erect attitude. The

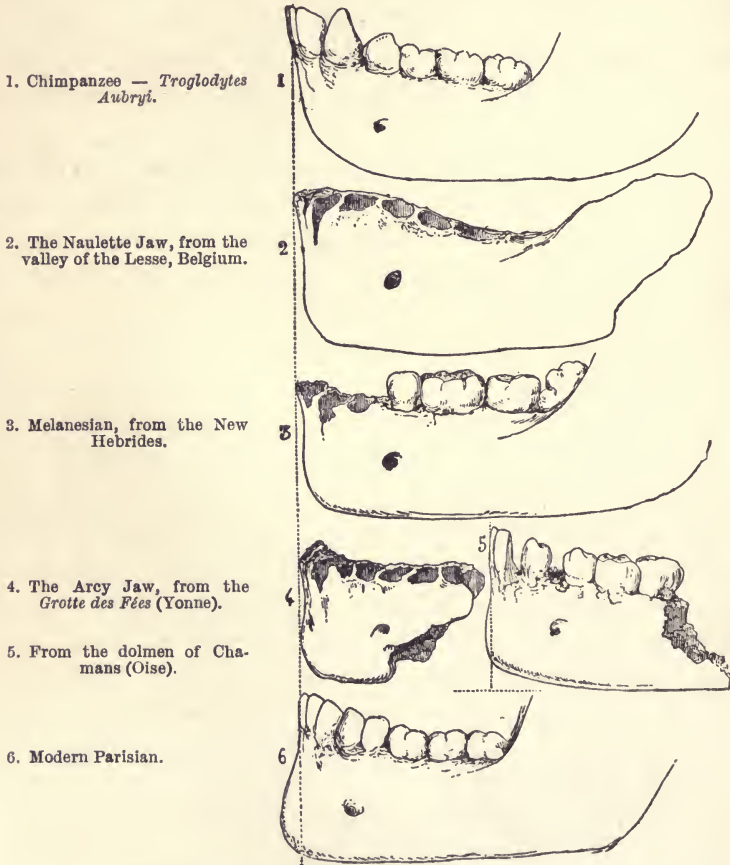


FIG. 4.—Profile of various Lower Jaws. (After Broca.)

evidential materials to be gathered from these different sources consist, in the one case, of some fragments of a few skeletons of former races, which by some fortuitous circumstances have to this day resisted the disintegrating forces of nature; and, in the other, of a number of specimens of man's handicraft works which, being largely made of such enduring material as

flint, are more abundantly met with. The successive modifications which these respective materials have undergone during a long series of ages, though different in kind, are found to bear a decided ratio to the progress of human intelligence. Thus, taking the human skull at the starting-point of humanity as comparable to that of one of the higher apes, we have just

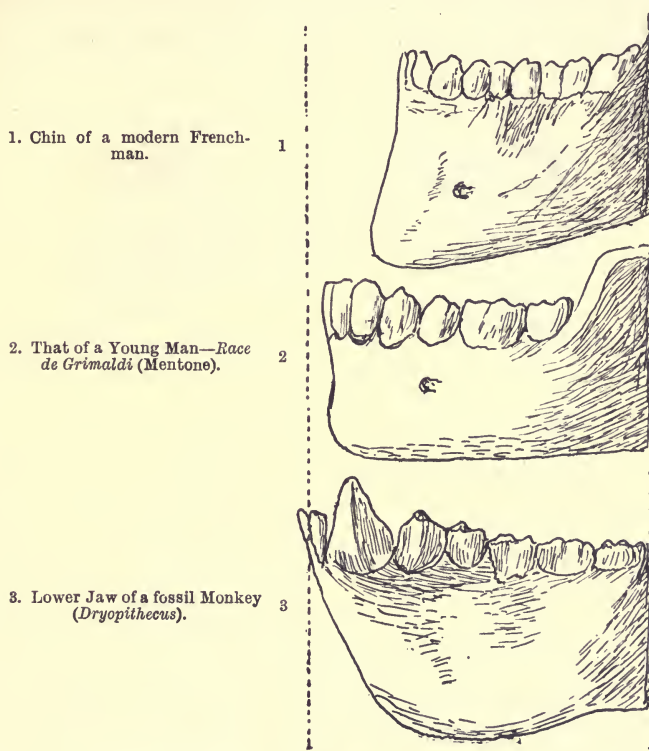


FIG. 5.—Profile of Lower Jaws. (After Gaudry.)

seen that during the onward march of time it has undergone some striking changes, both in form and capacity, before reaching the normal type of modern civilised races. Similarly, the artificial products of man's hands show a steady improvement in type, technique, and efficiency, commensurate with his progressive knowledge of the laws of nature, and his ability in applying them to mechanical and utilitarian purposes. Indeed, the trail of humanity along its entire course is strewn with the discarded weapons and tools which, from time to time, had to give way to others of greater efficiency. Such obsolete objects

are now only collected as curiosities to be preserved in archæological museums.

Prognathism.

It is to be observed that, as regards the gradual filling up of the cerebral, or anterior portion of the cranium, there are some striking differences in the prominence of the forehead, and the degree of prognathism of the face among living races.

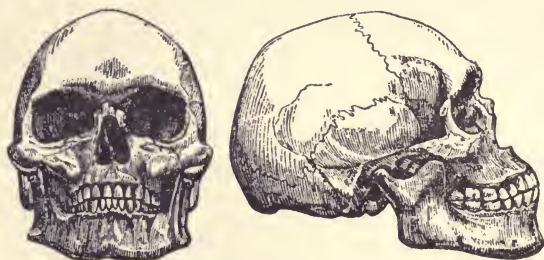


FIG. 6.—Front and side views of the Skull of a Native Australian. (After Owen.)

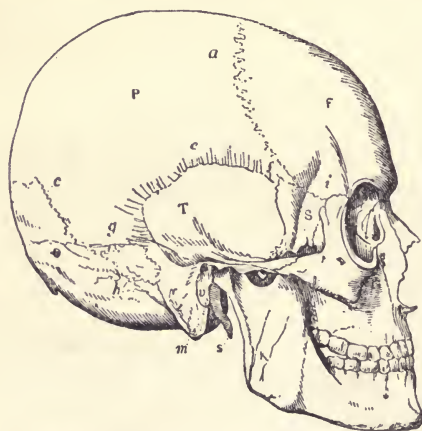


FIG. 7.—Skull of a well-formed European. (After Owen.)

To show the extent and character of these differences, I reproduce from Owen's *Comparative Anatomy* (vol. ii., pp. 558, 560), illustrations of two skulls, one labelled "Cranium of a native Australian" (Fig. 6), and the other, "Skull of a well-formed European" (Fig. 7), from which it will be at once seen that the former has a retreating forehead and a highly prognathic profile, while the latter has a well-filled forehead and an orthognathic face.

The next step in our argument is to show that some fossil skulls possess, in a more or less degree, the features of the Australian skull—the degree of divergence from the normal European type being in direct proportion to their antiquity. The skull of the famous human skeleton discovered in 1856 in the cave of Feldhoven, situated at the entrance to the Neanderthal ravine, and since known as the “Neanderthal skull,” presented such remarkable peculiarities that when first exhibited at a scientific meeting at Bonn, doubts were raised by several naturalists as to whether the bones were really human. Figs. 8 and 9 represent two views of this relic, outlined from figures



FIG. 8.—Side view.

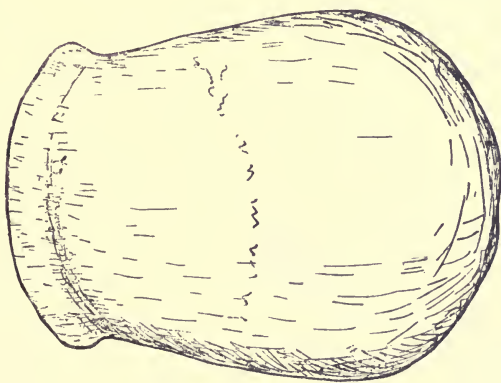


FIG. 9.—Top view.

The Neanderthal Skull ($\frac{1}{2}$). (After Huxley.)

published by Professor Huxley (*Collected Essays*, vol. vii., p. 180), from which its peculiar characters, especially the low, retreating forehead, may be seen at a glance.

The skull of one of the two skeletons, known as *Les Hommes*

de Spy (Fig. 29), shows a low, retreating forehead, marked prognathism, a sloping chin, and large third-molar teeth. In support of these views on cranial development a number of more recently discovered skeletons might be adduced; but as they are associated with other features of early human civilisation, they fall to be described later on.

A comparison of the skeletons of primitive races may therefore be regarded as a third line of research into the past history of mankind, and if it be conjoined with an archæological investigation of their handicraft products, important results may be expected. For it is quite evident that many of the savage races still surviving are merely side eddies of an earlier stream of culture through which civilised races have passed. They have merely thrown off old-fashioned garments for the more comfortable garb of the modern methods of living.

Biblical account of Creation.

The Biblical account of the creation of the world and man has exercised the minds of many of the most eminent philosophers, scientists, and religionists of our day. Although the attempt to reconcile its details with the ascertained facts of palæontology has failed, it is not necessary to regard the story as a mere fanciful myth. We must bear in mind that the doctrine of evolution was known as a speculation to the early inhabitants of India, Babylonia, and the eastern shores of the Mediterranean long before the writer in Genesis penned his memorable narrative. By distributing the work over five consecutive days a definite chronological sequence is affirmed, which gives an evolutionary character to the specific acts of creation therein recorded. On the supposition that these days represent vast periods of time, some critics maintain that the order in which life is made to appear corresponds to that disclosed by palæontological researches. Mr Gladstone, in his famous controversy with Professor Huxley on this subject (*Collected Essays*, vol. iv., p. 176, "Nineteenth Century," 1885-6), thus tabulates the chronological sequence of events as deduced from the Biblical narrative:—

- (1) A period of land anterior to all life.
- (2) A period of vegetable life anterior to animal life.

- (3) A period of animal life in the order of fishes.
- (4) Another stage of animal life in the order of birds.
- (5) Another in the order of beasts.
- (6) Last of all man.

It need hardly be said that the above sequence is not in precise harmony with the facts of palæontology, as any tyro can see that from the standpoint of evolution land-quadrupeds must have preceded birds. But although this and a few other details are decidedly out of joint, I do not think that the *tout ensemble* could have emanated from the brain of any one who had not some glimmering of the doctrine of evolution.

The main statements bearing on the creation of man have a remarkable parallelism to the facts of evolution. The upright posture, the most outstanding morphological feature of man, is signalised as the "image and likeness" of God. The act of disobedience in eating of the fruit of the Tree of Knowledge of Good and Evil secured to man a share of the divine prerogative of Wisdom, and opened his eyes to the momentous fact that in knowing good and evil he became henceforth a moral and responsible being.

CHAPTER II

MAN AND GLACIAL PHENOMENA

Great Ice Age. Stone Implements. Fauna. Inhabited Caves. Classification of Materials. *Chelléen, Acheuléen, Moustérien, Aurignacien, Solutréen, and Magdalénien* Epochs.

IN attempting to pry into the early history of mankind during the dim vista of the prehistoric period we bid farewell to the ordinary methods of historical research. The handicraft products of bygone races, their fossil remains and relation to the deposits of Quaternary geology, are the evidential materials with which we have henceforth to deal. By a careful examination of such data, on strictly scientific lines, anthropologists have been able to penetrate the darkness which so long settled on the earlier phases of human civilisation, and already the trail of humanity is distinctly limned on the horizon of geological remoteness. The high antiquity now attributed to man, together with an analysis of the arguments on which it is founded, presents to the human mind a most fascinating field of research. In order to understand the special methods involved in such an inquiry a few preliminary and explanatory observations are necessary, by way of illustrating the relation between the works emanating from the hand of man and those culled from the collateral sciences of geology and palæontology.

Great Ice Age.

About the beginning of the Pliocene Age the climate of Europe, which was then subtropical in its southern portion, began to grow gradually colder until it attained an arctic severity, during which Scotland and nearly the whole of England north of the Thames and Bristol Channel became covered with a huge mantle of ice. The glaciers radiating from

the mountains of North Britain coalesced with those of Scandinavia, and formed a vast *mer de glace* which spread like a fan far and wide, extending even into the Atlantic to within a short distance of the Færøe Isles. At the same time the Alpine glaciers, now reduced to pigmy dimensions, travelled far down their valleys. The Rhone glacier, for example, filled the whole of the basin now occupied by the Lake of Geneva to the height of some 3000 feet, and pushed its morainic débris high up on the slopes of the Jura Mountains. Similar phenomena obtained in corresponding latitudes in North America. The Glacial Epoch, or, as it is sometimes called, "the Great Ice Age," is by some regarded as going farther back than the Pleistocene period of Lyell, and the Quaternary of French writers. It lasted for a very long time, but not, according to some, as one continued span of advance and retreat of the ice, but rather as a series of successive Ice Ages, alternating with interglacial warm intervals. Professor James Geikie, who has made a special study of this subject, describes no less than six glacial epochs, with corresponding interglacial warm periods. On the other hand, Messrs Penck and Brückner limit their number to four. (*Great Ice Age*, 3rd ed., p. 607 *et seq.*)

That oscillations of considerable extent in the relative levels of sea and land had taken place during this period, is proved by the discovery of raised beaches and submerged old land surfaces in various parts throughout Western Europe. The former are well known to geologists, who describe them as existing at different elevations, sometimes amounting to over 1000 feet above present sea-level; and evidence of the latter, though more difficult to find, being under the sea, is not less convincing. On this point Professor Boyd Dawkins writes:—

"The remains of the late Pleistocene animal lie scattered over a large area in Britain, and it is necessary to conclude from their presence that our country formed part of the mainland of Europe at that time. This hypothesis is proved by their occurrence in various places now covered by the sea, as, for example, the mammoths found in Holyhead Harbour, off Torquay, off the coast of Sussex, and in the North Sea. On the Dogger Bank the accumulation of bones, teeth, and antlers is so great that Mr J. J. Owles, of Yarmouth, collected more than 300 specimens from the fishermen, who casually bring them up in their nets and dredges. They belong to the bear, wolf, spotted hyæna, Irish elk, reindeer, stag, urus, bison, horse, woolly rhinoceros, mammoth, and beaver, and are to be

viewed as the remains of animals living in the district at the time, and deposited by a river current, great with small, as in the case of similar accumulations on the land."¹ (*Early Man in Britain*, p. 148.)

During the interglacial warm period which followed that of maximum glaciation, or possibly before this, it would appear that the level of the Mediterranean Sea stood so low that land bridges connected Europe with Africa, thus permitting of an extensive immigration of the characteristic fauna of the latter into the former. This view, originally advanced by Dr Falconer and Admiral Spratt, is fully borne out by an examination of the fossil remains of Sicily and Malta. Any combination of physical causes which would exclude the waters of the Atlantic from the Mediterranean basin would, owing to evaporation being in excess of the influx volume of its rivers, convert the latter into two or more inland lakes, so that a large portion of its present bed would be occupied with a subtropical flora and fauna, among which, possibly, man himself found a congenial home—a suggestion which finds support in the fact that the earliest forms of flint implements are found in Algeria and other parts of the African continent. Subsequently, owing to a depression of the Mediterranean area, a junction between the waters of the Atlantic and the Mediterranean was effected through the Straits of Gibraltar, an event which, of course, obliterated the land bridges; the result of this was to effectually bar the return of the African fauna to their original home, when urged southwards by the increasing severity of the climate which culminated in another glacial period, and thus allowed the northern fauna to spread over central Europe. Henceforth both man and beast had to continue the struggle of life under novel and unexpected circumstances, the consequence of which was that these southern animals, such as the African elephant, spotted hyæna, lion, leopard, hippopotamus, etc., became practically extinct in Europe. The changes thus effected in the environment are of exceptional importance, because they are coeval with the history of man in Europe, during which he had to accommodate himself to all the domestic discomforts consequent on the

¹ These bones, a collection of which is in the Nat. History Museum of London, must have belonged to animals which lived in post-glacial times.

supervention of an arctic climate. So long as the glaciers and the *mer de glace* were on the increase, any remains of man or his works left within areas subsequently covered by the ice-sheet would be buried in the *moraine profonde*, with little chance of being recovered, so that evidence of his existence prior to the maximum period of glaciation can only be looked for in non-glaciated districts. But as the ice began to wane and was gradually passing away, the river-drift deposits and terminal moraines would remain scattered over the land, subject only to disturbance by the ordinary agencies of denudation. In the circumstances, any worked objects, such as stone implements, dropped into these sedimentary deposits, or washed down by rivulets, might remain as part of their contents to the present day.

Stone Implements.

Flint implements of a peculiar type, now admittedly the work of human hands, together with remains of extinct mammalia, have been found among the stranded gravels and brick-earth deposits of these ancient rivers in many localities throughout Europe. In non-glaciated districts it is often difficult to say whether such relics are pre- or post-glacial, as the date of their deposition might be at any time during the Glacial Epoch.

The final excavation and clearing out of the present valleys and waterways of Europe was principally due to the erosive effect of these torrential rivers, laden, as they must have been, with glacial detritus. The disintegrated materials swept down by them—gravel, sand, loam, or brick-earth—were deposited here and*there along their banks, and what remains of them may now be found in patches at various elevations, sometimes as high as 100 feet or more, above their present beds. Such deposits are occasionally observed on isolated prominences, as on the cliffs above Southampton Water, and those of Reculver in the lower Thames; and hence it may be difficult to trace the course of the original rivers which transported them. But this merely indicates the enormous length of time that has elapsed since the earlier gravels were deposited—a time sufficient to allow of the very trend of some of the cross streams

to be obliterated by the agencies of denudation. The older fluviatile deposits are manifestly those on the higher slopes, and their antiquity may be estimated by contemplating how long the particular river has taken to excavate the whole breadth of the valley down to its present bed. But this argument applies only to valleys that have unquestionably been so excavated. There are other valleys, such, for instance, as the lower portion of the Thames, which probably commenced to be excavated long before the advent of the Great Ice Age, and in these cases the washed-down materials might have been deposited in smooth water at an earlier period, and consequently their lowest strata would be the oldest. Examples of fluviatile deposits presenting this character are to be met with at Erith, Crayford, Ilford, and Gray's Thurrock, which, being outside the domain of the *mer de glace*, might, as was suggested by Dr Falconer, have been pre-glacial (*Quart. Journ. Geo. Soc.*, xiv., p. 83).

G. de Mortillet claims that the deposits at Chelles (Seine-et-Marne), although only 8 metres above the present bed of the Marne, belong to the oldest Quaternary period (*Le Pré-historic*, 3rd edition, p. 499). Also in the valley of the Somme the same kind of implements and fauna are found, both in the upper and lower gravels. In the vicinity of Abbeville, as at Menchcourt and Mautort, the flint-bearing deposits are only 12 to 15 metres above the sea; at Moulin Quignon, 30 to 32 metres; and at Mareuil, 35 metres (*Ibid.*, p. 563). Again, the Saint Acheul deposits, which have yielded an enormous quantity of flint implements of the coup-de-poing type, are 46 metres above the sea, and 26 metres above the river Somme. On the other hand, at Saint Roch and Montières, a mass of stratified gravels, only slightly elevated above the alluvial plain of the Somme, have yielded flint knives, tusks of hippopotamus, and an elephant's molar (identified by Dr Falconer as that of *Elephas antiquus*). (*Antiquity of Man*, p. 134.)

The stone implements from these widely separated localities have a strong resemblance to each other, and are readily distinguished from the more recent productions of Neolithic races. They may be classified under three types, viz.—a large pointed weapon, an oval-shaped instrument presenting a

cutting edge all round, and a knife flake, triangular on section, but not peculiar to any age. The first two types, the coup-de-poing of French writers (Pl. I.), have not been found in Britain north of a line from the Bristol Channel to the Wash; but to the south of this boundary they are widely distributed. Many specimens have been found in gravel-pits excavated for road metal along the higher ridges of the valleys of the Ouse and its tributaries (Cam, Lark, and Little Ouse). They appear to have been particularly abundant in the neighbourhood of Bedford, where the higher fluvial beds are about 59 feet above the river, and contain materials derived from the boulder clay through which the river has cut its channel. Mammalian remains have also been dug up from these drift-gravels, among

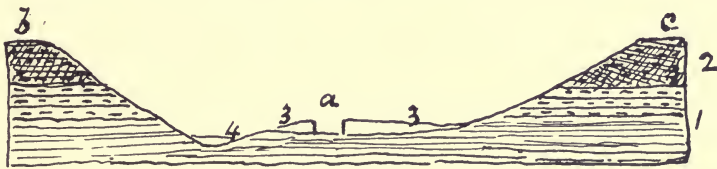


FIG. 10.—Section across the Valley of the Ouse, 2 miles W.N.W. of Bedford.

(After Lyell.)

1. Oolitic strata. 2. Boulder clay, or marine northern drift, rising to about 90 feet above the Ouse. 3. Ancient gravel, with elephant bones, fresh-water shells, and flint implements. 4. Modern alluvium of the Ouse. (a) Biddenham gravel-pits, at the bottom of which flint tools were found.

which the following were identified — cave-bear, cave-hyæna, reindeer, stag, urus, bison, *Hippopotamus major*, *Rhinoceros tichorhinus* and *megarhinus*, *Elephas antiquus*, mammoth, and horse (*Ancient Stone Implements*, etc., p. 480). Here, then, we have a clear case of implements of the coup-de-poing type posterior to the boulder clay. Sir C. Lyell gives a section of the valley of the Ouse, 2 miles W.N.W. of Bedford, constructed by the experienced geologists Prestwich and Wyatt (Fig. 10), which clearly shows the relation of these implements to the boulder clay; not only so, but some of them are made from stones which must have been picked out of the latter. In concluding his remarks Lyell thus writes:—

“At Biddenham, and elsewhere in the same gravel, remains of *Elephas antiquus* have been discovered, and Mr Wyatt obtained, January 1863, a flint implement associated with bones and teeth of hippopotamus from gravel at Summerhouse hill, which lies east of Bedford, lower down the valley of the Ouse, and 4 miles from Biddenham.

"One step at least we gain by the Bedford sections, which those of Amiens and Abbeville had not enabled us to make. They teach us that the fabricators of the antique tools, and the extinct mammalia coeval with them, were all post-glacial, or, in other words, posterior to the grand submergence of Central England beneath the waters of the glacial sea." (*Antiquity of Man*, p. 166.)

The river Waveney in Suffolk, which also flows over boulder clay, has left flint-bearing gravels some 50 feet above its present bed and at several points along its course, the most famous of which are in the vicinity of Hoxne. Similar implements have been found at many places within the valley of the Thames, as the neighbourhood of Herne Bay and Reculver. General Lane Fox (*Quart. Geo. Journ.*, Lond., xxviii., p. 449) has described specimens, including a triangular flake and an oval scraper, in association with remains of the mammoth exposed in the gravels at Acton Church in London. They are also discovered in considerable numbers in gravels along the Medway, the Stour, and their tributaries. Similar implements have been recorded from the neighbourhood of Salisbury, especially at Bemerton and Fisherton, a goodly number of which are now preserved in the Blackmore Museum. With the exception of the bone caves of Devonshire, no palæoliths have been discovered further west than Axminster. The stone implements from the river gravels of England are precisely similar to those from analogous deposits in France, such as the well-known specimens found by M. Boucher de Perthes at Abbeville and Amiens, in the valley of the Somme.¹

Fauna.

Coincident with the changes in the climate and physical geography of Europe, the flora and fauna of the country, which are so dependent on a uniform environment for the stability of their racial characters, could not fail to have been greatly affected. The result was the bringing together into Central Europe of a number of different species of animals, representing faunas so widely apart as those of subtropical and arctic regions. Dr Boyd Dawkins, whose accurate knowledge on the subject is

¹ It is unnecessary to dwell on the recorded discoveries of the river-drift implements and their distribution, as full details are given in works so accessible to the public as those of Lyell, Avebury, Evans, Boyd Dawkins, Hamy, de Mortillet, Déchelette, *Stone Age Guide to the British Museum*, etc.

so well known, thus describes the relation of contemporary mammalia to glacial phenomena :—

“As the climate in Europe changed, the Pleiocene species yielded place to those which were better adapted to the new conditions, either retreating southwards or becoming extinct. The first division of the Asiatic invaders is composed of the animals forming the temperate group above mentioned; they are found in the early Pleistocene strata, in Britain and in France, side by side with the survivals from the Pleiocene Age. No arctic mammalia had as yet arrived. The next stage in the migration is that in which the temperate group of animals had for the most part replaced the Pleiocene survivals, in Britain and in France, and the arctic mammalia began to appear, but only in small numbers. This constitutes the middle Pleistocene division. The third stage in the migration is indicated by the presence in full force of the arctic species in the area north of the Alps and Pyrenees. They are not, however, met with south of this boundary, and therefore this classification does not apply to the deposits of Spain, or the other portions of the Southern Zone.” (*Early Man*, p. 122.)

In his recent Huxley Memorial Lecture (*Journ. Anth. Inst.*, vol. xl.) the same author has categorically tabulated the successive migrations of the Pleistocene mammalia into Britain, and the fate of extinction which has befallen many of them.

The entire series of phenomena incidental to the varying phases of the glacial epoch are so complicated that it is difficult to realise the exact conditions which led to the intermingling of such different animals as are included in the lists of northern and southern faunas. On the supposition that the Ice Age was one climatic interlude, presenting a gradual extension of local glaciers until they culminated in a *mer de glace*, with of course a corresponding period for their retreat, as advocated by de Mortillet, the association of these different animals in Central Europe would be more readily understood. The following explanation of the problem from the standpoint of those who maintain that the Pleistocene comprised a series of successive ice ages, with warm interglacial periods, comes from the pen of Professor James Geikie :—

“In opposition to those who believed that the Palæolithic epoch was marked by strongly contrasted summers and winters, inducing great annual migrations, I maintained that the evidence betokened an alternation of cold and genial climatic conditions. The same view was subsequently set forth in my ‘Prehistoric Europe,’ where I have brought together the evidence derived not only from the mammalia, but from the former distribution of molluscs and plants. The facts which have since come to light all point clearly to the same conclusion, namely—that during Palæolithic times great changes of climate took place. All the

Pleistocene formations which occur outside of the glaciated areas—the valley-drifts, lignites and peat, lacustrine deposits, and calcareous tufas—tell the same tale of changing climatic conditions. During one stage of the Pleistocene period clement winters and cool summers permitted the wide diffusion and intimate association of plants which have now a very different range. Temperate and southern species, like the ash, the poplar, the sycamore, the fig-tree, the Judas-tree, etc., overspread all the low grounds of France as far north at least as Paris. It was under such conditions that elephants, rhinoceroses, hippopotamuses, and vast herds of temperate cervine and bovine species ranged over Europe, from the shores of the Mediterranean up to the latitude of Yorkshire and possibly even farther north still, and from the borders of Asia to the Western Ocean. . . .

“But during another stage of the Pleistocene period the climate of our continent presented the strongest contrast to those general conditions. At that time the dwarf birch of the Scottish Highlands and the Arctic willow, with their northern congeners, grew upon the low grounds of Middle Europe. Arctic animals, such as the musk-sheep and the reindeer, lived then all the year round in the south of France; the mammoth ranged into Spain and Italy; the glutton descended to the shores of the Mediterranean; the marmot came down to the low grounds at the foot of the Apennines; and the lagomys inhabited the low-lying maritime districts of Corsica and Sardinia. The land and fresh-water molluscs of many Pleistocene deposits tell a similar tale: high alpine, boreal, and hyperborean forms are characteristic of those deposits in Central Europe; even in the Southern regions of our continent the shells testify to a former colder and wetter climate. It was during the climax of these conditions that the caves of Aquitaine were occupied by those artistic men who appear to have delighted in carving and engraving.

“Before considering the evidence supplied by the Pleistocene deposits in the extra-glacial tracts of Central Europe, it may be well to indicate shortly what relation our cave-accumulations and valley-drifts bear to our glacial and fluvio-glacial deposits. Now, in the first place, it is obvious that the valley gravels and cave-accumulations contain essentially the same kind of mammalian remains—the northern and temperate and southern forms all belong to the Pleistocene period. In a word, the valley- and cave-deposits are approximately contemporaneous. Then, in the next place, it is not less obvious that the mammalian fauna of the interglacial beds is practically identical with that of the caves and valley-drifts. The presumption, therefore, is that our cave-accumulations and valley-drifts are the equivalents in time of our glacial and interglacial deposits.” (*Great Ice Age*, 3rd ed., pp. 642-4.)

With regard to these extracts I would just observe that both Boyd Dawkins and Geikie, while agreeing on the intermingling of the northern and southern fauna, give no indications of the stage in the sequence of glacial phenomena in which this intermingling took place. As an interglacial warm period is necessarily bounded at both ends of its duration by cold periods,

the northern fauna could advance into England, either before its commencement, or towards its close; while the southern fauna would only penetrate into the country during the maximum period of its geniality. Professor Geikie informs us in the extract just quoted that "the valley- and cave-deposits are approximately contemporaneous," a statement which appears to me doubtful in the present state of our knowledge. The implements of the cave-dwellers are not only different in type from those of the valley gravels in Britain and on the Continent, but also the fauna of the former have considerably changed. Prior to the most flourishing phase of the reindeer period, the early elephants, rhinoceroses, hippopotamuses, some African species, and other characteristic fauna of the river gravels, disappeared from Central Europe. It would also appear that it was during this interglacial period, which was posterior to the boulder clay and its concomitant land submergence, that some of the southern fauna spread as far north as the Victoria cave and the Welsh caverns. It was then that Palæolithic Man first appeared on the scene in Western Europe; and it is to be particularly noted that his industrial remains, as disclosed by the gravel beds of the south of England, and the Chelléen and Acheuléen deposits of France, are almost identical. Subsequent to this warm epoch came another ice age, but of smaller dimensions, during which man was forced to take refuge in caverns and natural rock shelters. This corresponds with the Moustérien epoch and its cultural elements. The hunters of wild animals, who then took up their abode in the Dordogne, continued to make this favoured locality their headquarters till the close of the Palæolithic period and the disappearance of the reindeer from France.

Whatever may have been the exact physical and climatal conditions that brought these heterogeneous floras and faunas together on the plains of Central and Southern Europe, whether genial interglacial periods, or extremes of temperature in the summers and winters, I will not venture to decide. One thing, however, is certain, that the succession of such extreme changes in the climate taxed the life-capacity and power of endurance of the Pleistocene mammalia to a degree which ultimately became unbearable. Now they have nearly all dis-

appeared from their former *habitats*, leaving their carcasses to tell the tales of their struggles. Some of them have become extinct, and others have betaken themselves to more congenial climates, according as they possessed northern or southern proclivities. Man was the contemporary of all these animals, and he is now the most conspicuous among the survivals who successfully battled against the adverse circumstances then prevalent in Europe.

Caves.

Human bones are not often found in the river-drift gravels, for the simple reasons that they were not numerous to begin with, and that being small, they have mostly disappeared by the ordinary process of decay. There is, however, another source of evidence which has yielded a large number of skulls and other portions of human skeletons, viz., the caves and rock-shelters which served as occasional retreats for the nomadic people who inhabited Europe during the lower and middle stages of the Pleistocene period.

The evidential materials disinterred from these localities are much more varied than those of the river-drift gravels, as they contain, in addition to the bones of man and the Pleistocene mammalia, a number of tools, weapons, and ornaments, together with food refuse, and other indications of the kind of social life prevalent among the people of those days. Many of the contemporary carnivorous animals, especially hyænas and cave-bears, frequented these caverns, and, like man, introduced into their interior recesses portions of the animals captured outside, there to be consumed in peace and security—thus accounting for the presence of bones of the mammoth, reindeer, horse, bovidæ, etc., in places absolutely inaccessible to those animals in a state of life. Caverns containing remains of human skeletons, or specimens of his handicraft works, associated with bones of the extinct mammalia are widely distributed, being found, more or less, in England, France, Belgium, Switzerland, Germany, Austria, Italy, Spain, and Portugal; but it is a significant fact that they are generally wanting in those countries which had not been inhabited till after the retreat of the *mer de glace*, such as North Britain, Scandinavia, and

North Germany. The scientific value of the contents of inhabited caves may be paralleled with that of the drift deposits, only greater care has to be taken in dealing with the former, as their deposits are subject to disturbances by later visitors, whether man or beast. There is one physical feature peculiar to caverns which deserves a passing word, as it is claimed to have a special chronological value, and that is, the deposition of stalagmite. If a layer of this substance be found overlying the débris of human occupancy, the merest tyro can see that the time since man occupied the cave can be equated with that which nature has taken to deposit the stalagmite—a problem which the chemist has often assayed to solve.

The characteristic flint implements of the drift are only sparingly met with in the earlier caverns frequented by man. Now it is a remarkable fact that there is very little difference, either in type or technique, between the implements of the earlier and later river gravels. On the other hand, those found in the caverns are all more or less different according to their antiquity, thus disclosing progressive skill and greater power of execution on the part of their makers. It has, therefore, been conjectured that few of the caverns were inhabited by man as early as the time when the first flint-bearing gravels were deposited. In these days the few nomadic specimens of humanity were content to wander along the streams and woods in search of fruits, buds, and the smaller animals, of which there was an ample supply. The coup-de-poing was, under the circumstances, sufficient to supply all their wants, more especially as they required neither houses nor garments. The usefulness of this primitive implement led to its long continuance, as a *sine qua non*, in the simple armoury of these early representatives of humanity.

Classification of Materials.

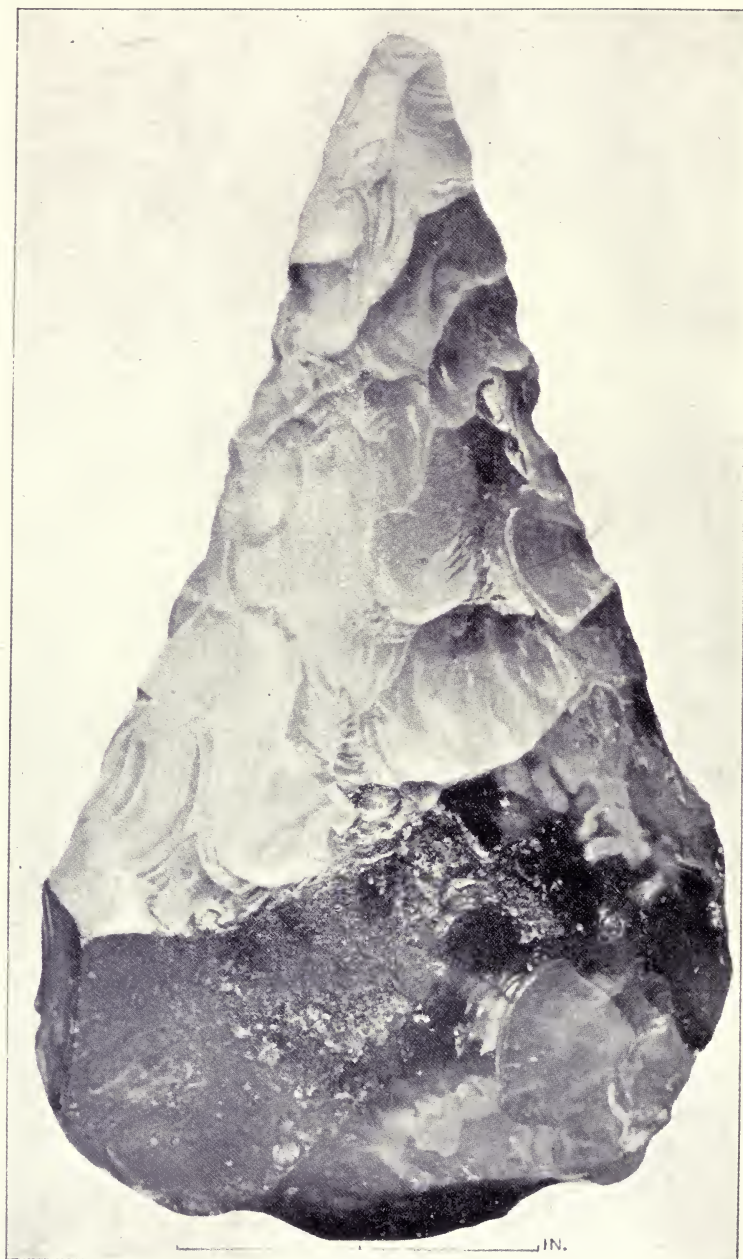
In the absence of positive chronology, every student of the pre-history of man will recognise the necessity of having some convenient method of tabulating the phenomena described in their order of succession, as geologists have so successfully done by collating fossils and other organic remains with the superposition of strata. In prehistoric archæology various methods

have been suggested, of which the following may be noted as applicable to the Palæolithic period :—

(1) To the epoch “when man shared the possession of Europe with the mammoth, the cave-bear, the woolly-haired rhinoceros, and other extinct animals,” Lord Avebury has given the name *Palæolithic*, in contradistinction to the *Neolithic*, or later polished Stone Age, the relics of which show an advance in manipulative skill, and are generally found on, or in, surface soil. This convenient nomenclature has taken a permanent place in archæological literature, and is freely used in the present lectures. As a corollary to the above division may be appended the word “Eolithic,” which includes the rudely chipped flints called “eoliths,” supposed to be the implements used in pre-Palæolithic times.

(2) Professor E. Lartet proposed a classification based on the antiquity, date of extinction, and comparative abundance of certain animals represented in bone caves. On these grounds, starting with the oldest, he suggested the ages of the cave-bear, mammoth, reindeer, and auroch, as convenient standards of comparison. But to this system there are many objections, as most of these animals lived together; nor did they die out in all districts at the same time. M. Ed. Dupont adopted the ages of mammoth and reindeer, as being more appropriate for the description of archæological remains found in the Belgian caves.

(3) In the formation of the coup-de-poing (Pl. I.) a selected nodule was used and chipped on both sides, and, as a rule, the chips were thrown aside as waste material. As soon, however, as it became apparent to the operator's growing intelligence that flakes could be utilised as convenient instruments in the execution of a number of small mechanical operations, the coup-de-poing was gradually discarded. By subjecting well-formed flakes to secondary chipping, implements of great variety and efficiency were, in the course of time, manufactured, such as knives, scrapers, borers, saws, etc., evincing on the part of their makers a progressive knowledge of mechanical principles and the power of execution. Hence, in 1869, Gabriel de Mortillet conceived the happy idea of classifying the industrial remains of the Palæolithic people in chronological sequence, according to



Flint Implement, found in Gray's Inn Lane (†). (British Museum Catalogue.)

the degree of culture disclosed by the relics found on certain stations which he regarded as typical. His classification at first consisted of four epochs, viz.,—*Acheuléen*, *Moustérien*, *Solutréen*, and *Magdalénien*, names derived from Saint Acheul (Somme Valley), the cave of le Moustier (Dordogne), the rock-shelters of Solutré (Saône-et-Loire), and la Madeleine (Dordogne). Subsequently, on the discovery, in 1878, of the famous gravel-beds at Chelles (Seine-et-Marne), which contained flint implements supposed to be of an earlier and purer type than those of Saint Acheul, he used *Chelléen* as his first epoch, but still retained Acheuléen, as a later phase of it.

(4) Professor Fraipont of Liège thus defines the classification of the Palæolithic period, which he adopted in his writings:—

- (a) L'époque de l'*Elephas antiquus* et du *Rhinoceros merckii*, correspondant à l'époque Chelléenne de M. G. de Mortillet.
- (b) L'époque du mammoth et du *Rhinoceros tichorhinus*, correspondant à l'époque Moustérienne de M. G. de Mortillet.
- (c) L'époque du renne, correspondant à l'époque Magdalénienne de M. G. de Mortillet. (*Les Cavernes et leur habitants*, p. 57, 1896.)

At the Monaco meeting of the International Congress of Prehistoric Archæology (1906), M. l'Abbé Breuil advocated the revival of the term Aurignacien to represent certain well-defined relics, which he regarded as pre-Solutréen rather than Magdalénien—a distinction formerly recognised by Lartet and Hamy (*Précis de Paléontologie Humaine*, p. 257).

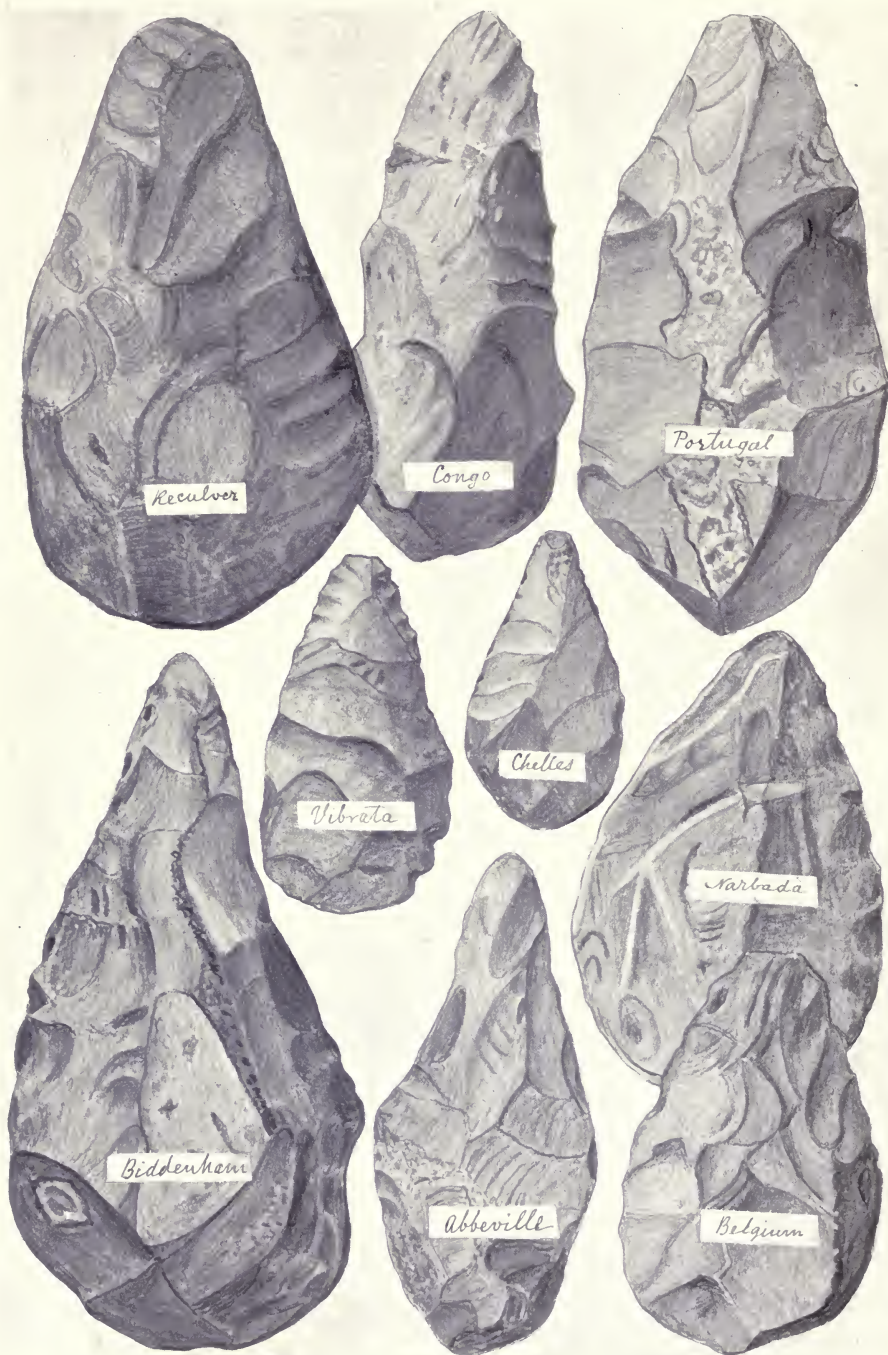
As this addition to Mortillet's nomenclature is based on recent discoveries, it has only lately come into general use among French archæologists. With this addition I consider Mortillet's classification the most practicable that has hitherto been suggested. As it is essential to have precise ideas associated with the different phases of culture represented by the terms of de Mortillet's nomenclature, we will now proceed to give a brief description of the typical stations from which they have been derived, as well as of a few of the most representative objects found in them, or in stations which are supposed to belong to the same phase of culture.

Other methods of classification have been suggested, but as they are more or less modifications of that of Mortillet, generally arising out of variations in the archæological materials in different countries, such as that adopted by M. A. Rutot of Brussels (*Congrès de Dinant*), they require no further notice.

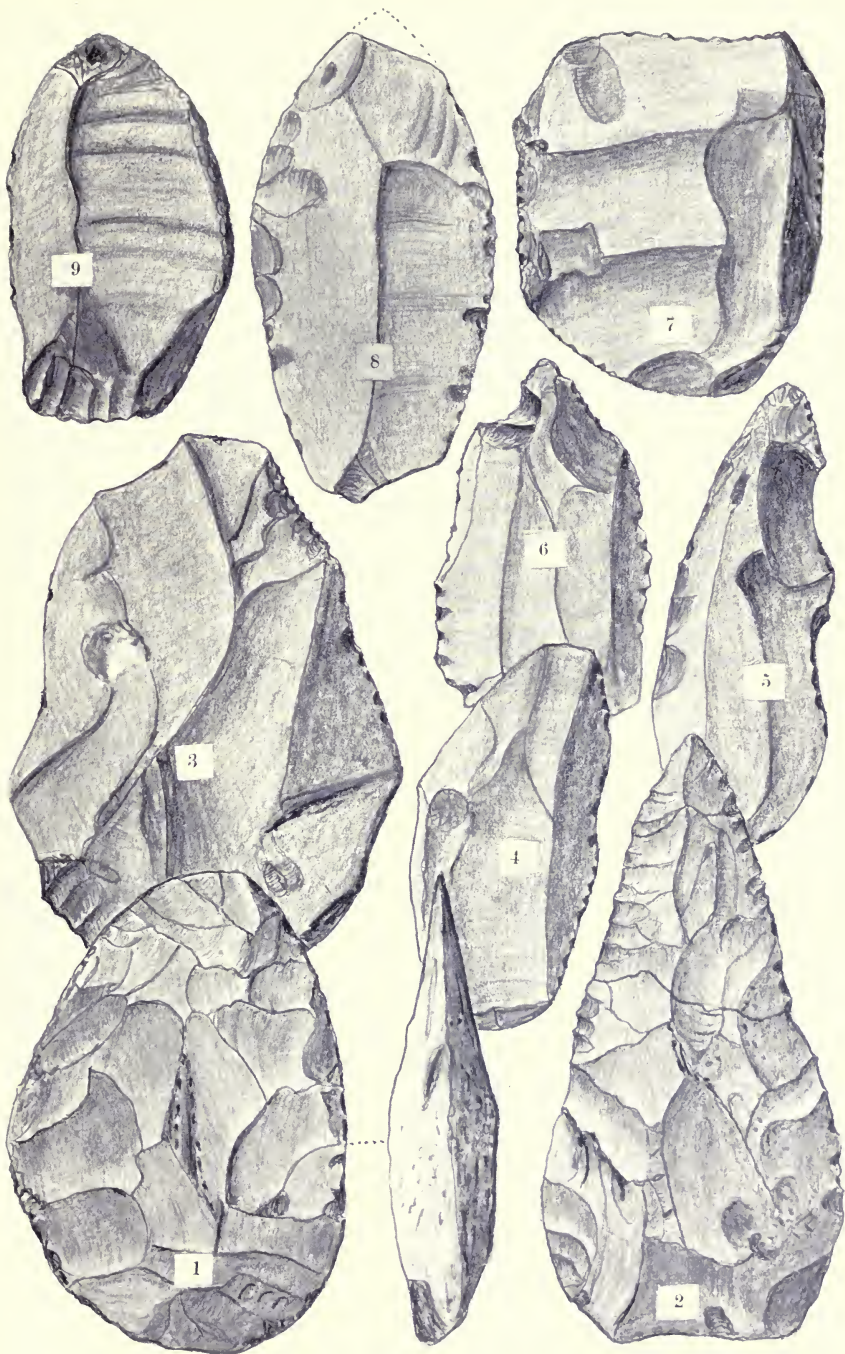
As all these so-called epochs are mere halting-points on the high road of man's advancing civilisation, it is often difficult to determine to which epoch relics from intermediate stations are to be assigned.

Chelléen.

The alluvial gravels at Chelles form a small plateau about 8 miles east of Paris, 48 metres above the sea, and 8 metres above the bed of the Marne, from which it is 2 kilometres distant. A section shows three separate layers, within a thickness of 8 metres, resting on Tertiary deposits. The lowest layer is especially interesting, on account of the number of teeth of *Elephas antiquus* and *meridionalis* (Fig. 11) which it has yielded, associated with remains of *Hippopotamus major*, *Rhinoceros merckii*, *Trogonthérium*, cave-bear, and cave-hyæna, together with flint implements almost exclusively of the coup-de-poing type. These animals were survivals from the Pliocene Age, and the presence of their bones in any locality indicates a warm climate. The middle portion of the deposits was cemented by calcareous infiltrations, and both it and the upper sandy gravels were later formations, and contained only bones of the mammoth and flint implements of Moustérien types. Mortillet regarded the relics of the lowest bed as the oldest evidence of the existence of man in France, outside the so-called Eolithic flints of the Tertiary period; and hence he took it as the most typical station in his classification of the Palæolithic industry instead of Saint Acheul. There is not, however, much difference between the oldest flints of the two stations. Those of the latter have a greater variety of forms, and the coup-de-poing is sensibly thinner, smaller, and more delicately chipped at the edges. The more pointed of the Chelléen types are known to the workmen as "ficrons," while the almond-shaped specimens, called "limandes," are characteristic Acheuléen forms (Pl. III.) Moreover, the two earlier elephants *E. antiquus* and *E. meridionalis*, and *Rhinoceros*



Flint Implements (Coups-de-poing), from Different Countries.
 (All $\frac{3}{4}$, except that from Vibrata = $\frac{2}{3}$, and from Chelles = $\frac{1}{4}$.)



Flint Implements from the Upper Gravels of Saint Acheul (all $\frac{1}{2}$). (After Commont.)

[Between pp. 40 and 41]

merckii have been found in the lower alluvial beds at Abbeville. Of the fauna of the period no less than seven species are extinct, viz.,—the two early elephants, cave-bear, cave-hyæna, *Machairodus*, *Rhinoceros merckii*, and *Trogonthérium*. The

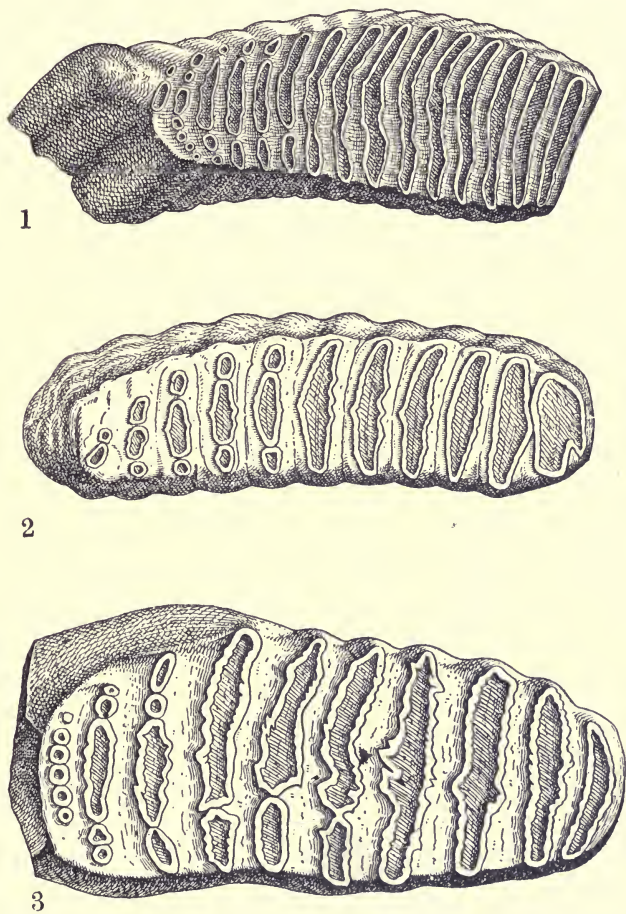


FIG. II.—Last Molar but one, lower jaw, right side, of the three principal elephants of antiquity. 1. *Elephas primigenius* (Mammoth). 2. *E. antiquus*. 3. *E. meridionalis* (after Ad. de Mortillet. (All $\frac{1}{3}$ natural size.)

hippopotamus, though not extinct, also disappeared from Europe. All these animals required a warm, moist climate. Human bones have not, to my knowledge, been found in deposits of the Chelléen epoch, but the flint implements are sufficient evidence that man lived at that time in Central Europe. The coup-de-poing, which was almost the sole

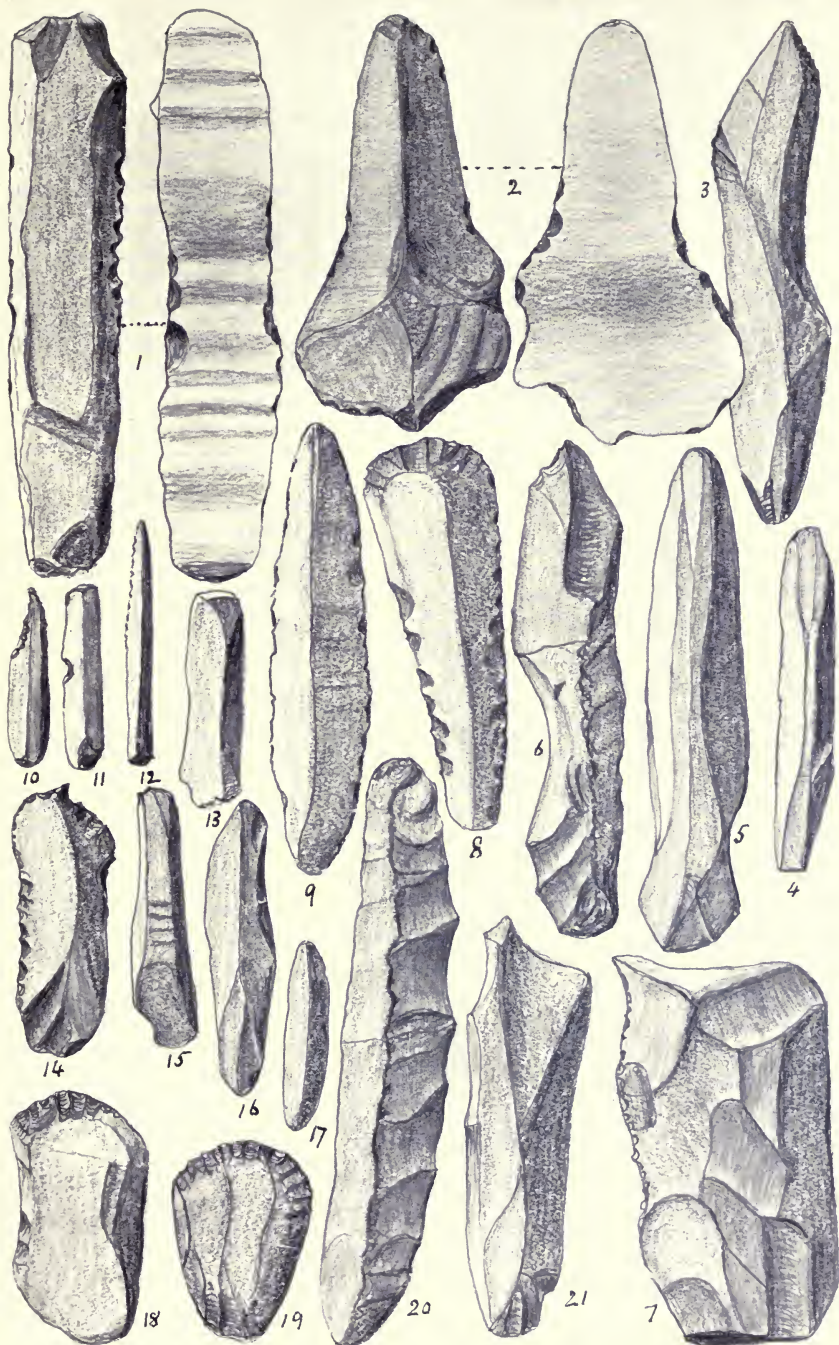
implement used by him, proves by its wide distribution that it held this distinction for a very long time. Typical specimens have been discovered not only in all European countries (except Holland and Scandinavia), but in Algeria, Egypt, Sahara, Congo, the Cape, Somaliland, Palestine, Persia, and India (Pl. II.).

Sir Charles Lyell points out that the mammalia represented in the fluviatile alluvium at Gray's Thurrock were *Elephas antiquus*, *Rhinoceros merckii*, *Hippopotamus major*, a species of horse, ox, bear, stag, etc., a fact which suggests that these remains in the Thames valley belong to the Chelléen or Acheuléen epoch (*Antiquity of Man*, p. 157).

Professor Geikie also informs us that "in the valley of the Thames the 'drifts' with palæolithic implements and pleistocene mammalian remains are everywhere overlaid by 'trail,' but are certainly younger in the main than the great chalky boulder-clay, and must therefore likewise be assigned to interglacial times" (*Great Ice Age*, 3rd ed., p. 644).

Acheuléen.

The valley of the Somme lies in a chalk district bounded by hills from 200 to 300 feet in height, and is of special interest as being the scene of M. Boucher de Perthes' discovery of palæoliths at Abbeville, some fourteen years before they were scientifically recognised to be the work of human hands. M. de Perthes commenced to collect these implements in 1841, which he discovered in ordinary gravel-pits, then being largely worked for industrial purposes. They were found at a depth of 8 to 10 metres, generally at the bottom of the worked pits. He styled them "antediluvian," because they came from the lowest beds of ancient alluvial strata bordering on the valley of the Somme, which geologists termed "diluvium." Along with them were found bones of the mammoth and other animals, which Cuvier characterised as *Ossements fossiles*. Dr Rigollot, of Amiens, at length became a convert to the genuineness of M. de Perthes' discoveries, and on looking for similar implements in his own neighbourhood, he soon found them in great numbers, chiefly in the gravel-pits at Saint Acheul. Some of these implement-bearing gravels were almost on a level with the



Flint Implements from the "Terre à Briques." Belloy-sur-Somme, 1-7; Montières, 8, 9; Saint Acheul, 10-21. (No. 20 = $\frac{2}{3}$; all the rest = $\frac{1}{2}$.) (After Commont.)

Somme, as at Saint Roch, others were 30 or 40 metres above the level of the river, and on both sides of the valley. G. de Mortillet informs us that he collected Chelléen types at an altitude of 50 or 60 metres (*Le Préhistorique*, p. 563).

Sir Charles Lyell gives a section across the valley showing the relation of the different deposits to each other.

Since the publication of the *Antiquity of Man*, further discoveries both at Abbeville and Amiens, especially those of M. Dault du Mesnil, have confirmed the presence of all the three elephants, as well as the *Rhinoceros merckii*, in the lowest strata, both in the high and low level gravels (*Rev. de l'Ecole d'Anthrop.*, 1896, p. 286).

M. Commont, who has been for several years assiduously working out the complicated problems of the Somme Valley, especially at Saint Acheul, published an important paper on "L'Industrie des Graviers Supérieurs à Saint Acheul" (*ibid.*, 1907, p. 15). On Plate III. are figured a few specimens of the flint implements from these gravels, Nos. 1 and 2 representing pre-Moustérien types, the so-called "limandes" and "ficrons" of the workmen. Nos. 3, 4, 7 represent the "Levallois flake," so named from its abundance among the flint industry found on the station of Levallois-Perret, near Paris, and regarded as the most characteristic implement of the Moustérien epoch. It is this special form which has given the coup de grâce to the ovate and later Acheuléen implements, which, being chipped on both sides, ultimately became so thin that they were apt to break on usage. On the other hand, the Levallois flake was carefully chipped, but only on one side. The *modus operandi* in its manufacture is interesting. The operator, holding the raw flint nodule in his left hand, carefully chipped one surface, and then with a well-directed blow separated the entire worked surface from the rest of the nodule. The tools thus produced had sharp edges, and, being thicker in the middle and towards the bulb of percussion, they were more effective and less liable to be broken than the later Acheuléen specimens.

The upper part of the Quaternary deposit in the district of Saint Acheul forms a bed of reddish mud ("limon supérieurs ou terre à briques") which covers the slopes of the valley up

to a height of about 65 metres (but does not exist on the plateau), above which the upper gravels crop up to the surface. On the other hand, on descending towards the river the "terre à briques" increases in depth till it attains an average thickness of 1 metre. Since its original deposition it has, however, been more or less affected by ordinary denuding agencies, so that the washed-down materials have accumulated in certain hollows to a depth of 2 or 3 metres. Thus, at the Tellier brick-works the depth of the "terre à briques" is 2.50 metres, and at Renancourt, in the small valley of the Selle, it amounts to 3 metres. In the upper layers of these accumulations, Neolithic and even Roman and Mediæval remains are not unfrequently met with.

Underneath the "terre à briques" lies a yellowish sandy clay called *Ergeron*, which is supposed to be a kind of *loess*, and contains flint implements of Palæolithic types. M. Commont has directed attention to the fact that at the junction between these two deposits, which probably at one time formed a habitable land-surface, he has found flint implements which may be paralleled with Magdalénien types. His discoveries are embodied in an illustrated paper, entitled "L'Industrie de la base de la terre à briques à Saint Acheul, Montières, Belloy-sur-Somme" (*ibid.*, 1907, p. 239). A few of the flint objects described and figured by the author are represented on Plate IV., which will give some idea of their character, and the industrial stage to which they belong. They were found partly at the base of the "terre à briques," and partly embedded in the *Ergeron* at Saint Acheul (Nos. 10 to 21), Montières (8 and 9), and Belloy-sur-Somme (1 to 7). As will be seen from the illustrations, they represent most of the ordinary varieties of flint implements found in the upper deposits of the Palæolithic period, such as scrapers, flakes, burins, nuclei, etc.

The "terre à briques" is sometimes confounded with another reddish clay, described as "limon rouge sableux (limon fendillé)," which lies below the upper gravels, and is also used for making bricks and for foundry purposes. Especially is this the case when the former is absent, as sometimes happens in some of the pits. The "limon fendillé" lies over a whitish calcareous mud, called "terre à pipe." The stratigraphy of these different

deposits becomes very confusing to those who have not the advantage of practically examining them *in situ*, on account of the irregularity of their respective depths, and the fact that one or more members of the series may be altogether absent. The accompanying section at Saint Acheul (Fig. 12), Carrière Bultel (altitude 54 metres), drawn up by M. Commont, gives the succession and relative magnitude of the respective deposits at that locality.

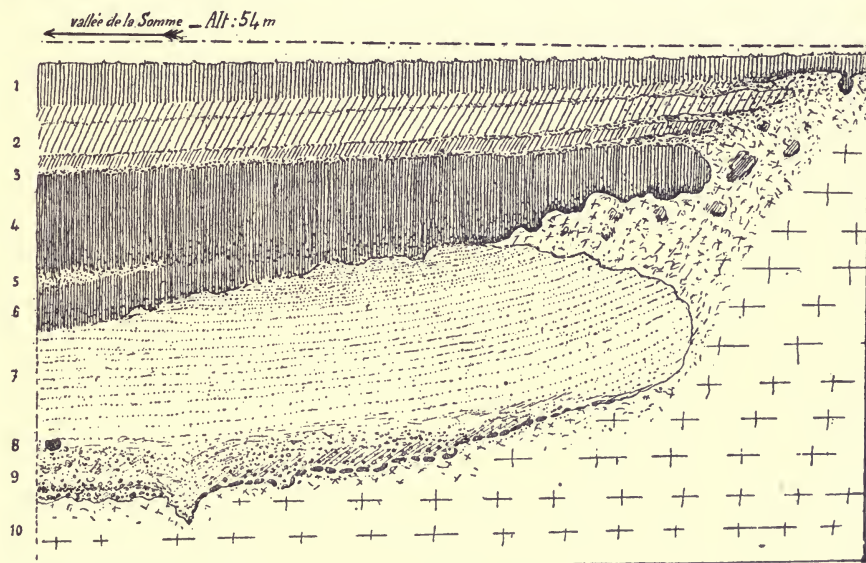


FIG. 12.—Section taken at Saint Acheul, Carrière Bultel. (After Commont.)

| | No. | M. | |
|-------------------|-----|------|---|
| Magdalénien . | 1 | 0.70 | Terre à briques. |
| | 2 | 1.20 | <i>Ergeron</i> . |
| | 3 | 0.20 | Upper gravels. |
| Moustérien . | 4 | 1.60 | <i>Limon fendillé</i> . |
| | 5 | 0.80 | <i>Limon gris sable jaunâtre</i> , which attains several metres in thickness, in an adjacent pit. |
| Upper Acheuléen . | 6 | 0.70 | Reddish sands and gravel. |
| Acheuléen . | 7 | 2.40 | Beds of yellowish sand, with streaks of chalk. |
| | 8 | .. | Transported blocks of chalk. |
| Chelléen . | 9 | 0.70 | Lower gravels, with beds of whitish sand, containing Tertiary shells—increases in thickness towards the valley. |
| | 10 | .. | Chalk rock. |

These researches of M. Commont suggest problems of far-reaching significance. If the valley of the Somme, during its excavation, presented continuous and successive land-surfaces, yielding a flora and fauna sufficient to supply its Palæolithic races with the necessities of life, it is clear that the geological and archæological phenomena of the locality have not yet been fully understood. It cannot be supposed that the

caves and rock-shelters, to which so many of the inhabitants resorted on the recrudescence of the last great glacial epoch, were in sufficient numbers to afford accommodation for all persons who suffered from the increasing severity of the climate. What protective means did these open-air nomads adopt? We have no evidence to show that they dug holes in the earth and covered them with wooden roofs, as the Neolithic folk did in the construction of their well-known hut villages.

Similar difficulties beset archæological researches in the English drift deposits containing Palæolithic implements. At various levels on the flanks of the present valley of the Thames are found a series of gravel terraces, deposited by the river at various stages in its history, precisely analogous to the gravel terraces of the Somme Valley. The lowest of the Thames terraces is 10 to 25 feet above the present level of the river, the others being respectively 60, 100, and 200 feet high. But the modern river does not lie at the bottom of the maximum depth of the basin, as at Tilbury it is upwards of 70 feet lower. When the Tilbury docks were being excavated, it was proved that the bank of the river was composed of sedimentary gravel, peat, and the débris of the successive land-surfaces containing human remains. This shows that the valley has been gradually sinking for a very long time, probably for many thousands of years. Also at various heights above the present river, Palæolithic floors have been described by several competent investigators. Such habitable sites with remains of workshops for the manufacture of flint tools have been recorded by Mr Worthington G. Smith, at Caddington, and by Mr F. C. G. Spurrell, as existing at Crayford, a station on the south bank of the Thames, and described in Chapter IV.

Moustérien.

Among the earliest caves inhabited by man was that of Le Moustier, situated on the right bank of the Vézère, and about 90 feet above it. It was examined by Messrs Lartet and Christy in 1863, and subsequently by de Vibraye, Massénat, and others. Besides the deposits in the interior of the cave, there was an outside plateau in which human skeletons have been recently found, and which will be described later on.

During its habitation by man the climate appears to have been cold and damp, and among the contemporary fauna were the mammoth, woolly-haired rhinoceros, cave-bear, and musk-ox. The two earlier elephants and the *Rhinoceros merckii* were not represented.

The special features of its industrial remains were the scarcity of the coup-de-poing, and the splitting up of flints into smaller implements, such as scrapers and large flakes, mostly trimmed on one side as already described. This multiplication of small implements was due to the fact that man, owing to the coldness of the climate, was obliged to seek shelter in caves, or improvised huts, and to clothe himself with skins, the preparation of which, especially in the later epochs, entailed the use of special tools and instruments. On the whole, the remains of man's handicraft works disclose an advance on those of the "drift-men"; but there was a sufficient sprinkling of the latter to show that both people were of the same race.

Aurignacien.

Prior to 1852 the small grotto of Aurignac (Haute-Garonne) was concealed by a talus, and only then incidentally discovered by a workman in pursuit of a rabbit. The entrance was closed by a stone slab, and inside were the remains of seventeen human skeletons, which, on the discovery becoming known, were, by order of the mayor of the town, removed, and reburied in the parish cemetery. Outside the flagstone which closed the entrance to the cave were found, along with ashes and a hearth made of flat stones, a finger-marked circular hammer-stone used for chipping flints, and "a great variety of bones and implements; amongst the latter not fewer than 100 flint articles—knives, projectiles, sling-stones, and chips, and among them one of these siliceous cores or nuclei with numerous facets, from which flakes or knives had been struck off. . . . Among the bone instruments were arrows without barbs and other tools made of reindeer horn, and a bodkin formed out of the more compact horn of the roe-deer" (*Antiquity of Man*, p. 184). One of the bone objects, pointed at one end and having a broad split base (Pl. V., No. 1), is regarded as giving the station its special character. Scattered through the earth

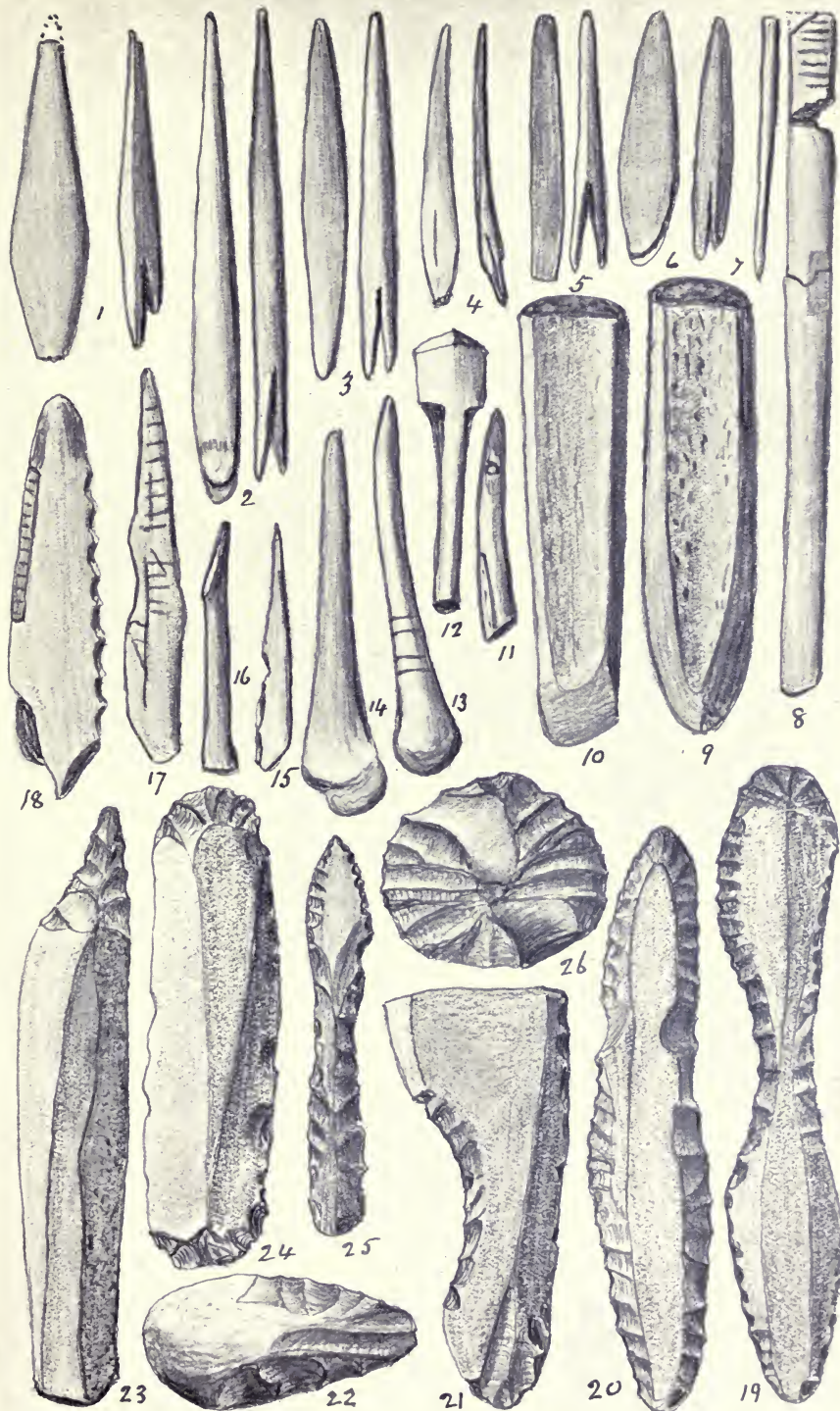
were the broken bones of extinct animals, among which the following may be mentioned:—hyæna, cave-bear, cave-lion, woolly-haired rhinoceros, reindeer, Irish elk, and mammoth.

At that time, Lartet and others thought the above fauna was contemporary with the sepulchral remains within the grotto; but the latter are now regarded by many as having belonged to the Neolithic period, and if so the bones must have been buried long subsequent to the time when the cave was a rendezvous for the Palæolithic hunters. Lyell states that with the human bones inside the cave “were 18 small round and flat plates of a white shelly substance, made of some species of cockle (*Cardium*), pierced through the middle, as if for being strung into a bracelet” (*ibid.*, p. 188). A carved and perforated tooth of *Ursus spelæus*, together with a few teeth of the cave-lion and wild boar, were also found in the ossuary.

To Piette belongs the merit of showing that works of art made their first appearance as Eburnean sculptures in the station of Brassempouy (Landes), which, stratigraphically, he regarded as belonging to the Aurignacien Age. These sculptures consist of figurines in ivory, mostly of nude women, but no animal forms (Pl. XXVIII.). In the Grotte du Trilobite (Yonne) the Abbé Parat discovered in the upper layer of Aurignacien deposits a characteristic bone-point split at the base, and associated with a piece of schist stone, having the fragmentary outlines of the woolly-haired rhinoceros and other animals scratched on it (Fig. 13). These archaic designs appear to have been the first of a style of decorative art which, at a later period, was much used to adorn the walls of the caverns. (R.E.A., 1906, p. 244.)

Various bone implements in the form of pins or pointers and chisels, with transverse scratchings (*Marques de Chasse*), as well as flint objects, have been found on the station of Les Cottés (Vienne), and are regarded by Breuil as characteristic of the Aurignacien epoch (*ibid.*, p. 54). A number of these relics are illustrated on Plate V.

The cave of Les Cottés is situated in the commune of Saint-Pierre de Maillé, on the left bank of the Gartempe, at a distance of about 150 metres from the river, and 7 metres above its level. The interior consists of two spacious chambers, dry



Objects Illustrating the Aurignacien Epoch. Aurignac, 1; Chatelperon, 13-14;
La Grotte des Cottés, all the rest. (All $\frac{1}{2}$.) (Chiefly after Breuil.)



and airy, and in front there is a terrace 2.50 metres wide. The cave was explored in 1880 by M. R. de Rochebrune. The relics were found in a thin black band of organic débris at the base of a yellowish compact mass of clay, about a metre thick, which lay under 6 or 8 inches of superficial soil. The black band contained worked flints in great numbers, instruments made of bone, ivory, and reindeer-horn, as well as remains of mammoth,

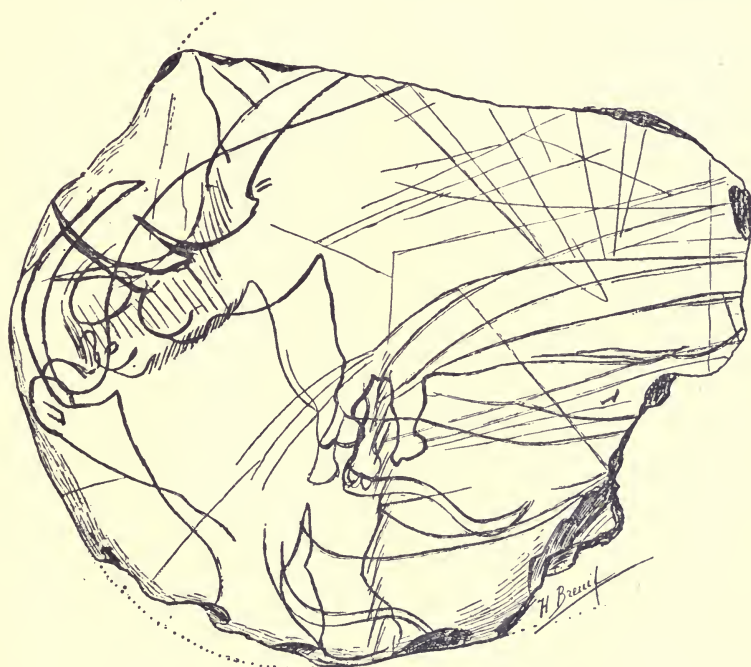


FIG. 13.—A Plaque of Schist, with incised figures of Woolly Rhinoceros and other Animals. Found by the Abbé Parat in *Grotte du Trilobite*. (After Breuil.) (A little less than natural size.)

rhinoceros, cave-bear, hyæna, etc. The tusk of a mammoth, 1.45 metres in length, had a bone-pointer split at the base (Aurignac type) adhering to its surface. Beneath this relic bed was a deposit of sandy clay which yielded coarsely worked flints of Moustérien types, but no knives nor any bone instruments were found in it. The excavations were continued to the front terrace, and there also the black relic bed appeared at a depth of 2 metres from the surface. It was here that the two curious objects described as “deux flacons faits d'un canon de renne” were found. They are figured by Breuil, and his illus-

trations are here reproduced as Fig. 14. They were both made of the cannon-bone of the reindeer, and evidently intended for the same purpose. One is a fragment, but the other is nearly complete, and is figured under three aspects. The latter takes the form of a slender bone-case, or small flask. The rim is evenly cut across and polished, the neck is ornamented with an

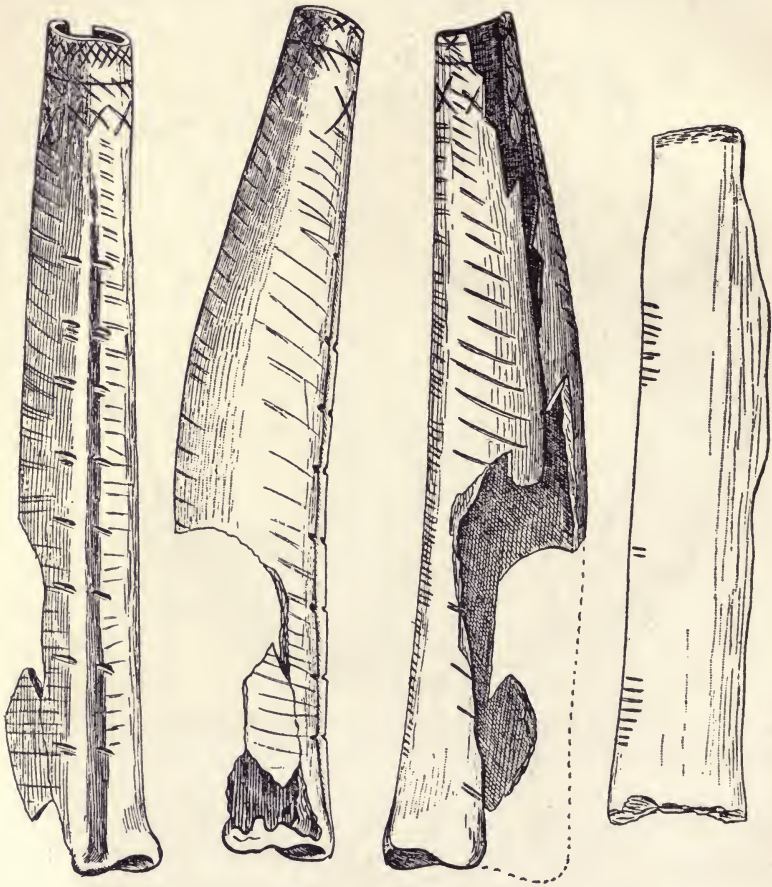


FIG. 14.—Bone Tubes which served as flasks for ochre ($\frac{1}{2}$). *Grotte des Collés.*
(After Breuil.)

incised circle and cross-hatching, and the body shows two rows of transverse lines. The other, of which the neck and lower end only were found, has no ornamentation. The lower end was found to contain a quantity of powdered ochre, thus at once suggesting that these bone bottles were the artists' paint-boxes.

Similar bone tubes have been frequently found on later stations than the Grotte des Cottés, but they were generally looked upon as *étui* for carrying needles, pins, etc. But the use now suggested for them does not prove that painting was common in the Aurignacien epoch, as the colouring matter might have been intended for toilet purposes.

Solutréen.

The station of Solutré (Saône-et-Loire) was an open-air encampment, having a fine exposure to the south, and sheltered on the north by a steep ridge. The climate was mild and dry, the glaciers were already on the retreat, and the rivers less torrential. The remains of the settlement, covering an area of about 10,000 sq. metres, are situated just beyond the limits of the cultivated land, and within a short distance of a good spring of water. The site has been partially excavated by MM. Ferry, Arcelin, Ducrost, and others, the results of which are published in a number of memoirs, the most accessible being that in the Norwich volume of the International Congress of Prehistoric Archæology (1868). The stage of civilisation here disclosed was characterised by great perfection in the art of manufacturing flint implements, especially spear-heads in the form of a laurel leaf (Pl. VI., No. 16), and by the abundance of horses and reindeer which inhabited the surrounding country. According to G. de Mortillet (*Formation de la Nation Française*, p. 237), the chipping of flints, which hitherto had been effected by percussion blows with a stone hammer, was now also performed by pressure, a method which permitted of the execution of more delicate work. Human occupancy was indicated by a number of hearths, around which characteristic implements of flint and reindeer-horn were found. The surrounding débris consisted almost entirely of broken bones, chiefly those of the horse and reindeer, evidently the remains of animals that had been used as food by the occupants. Encircling the south side, the bones of horses were amassed to such an extent as to form a kind of protective wall to the settlement. According to MM. Ferry and Arcelin, a cubic metre of this osseous *magma* contained forty entire cannon-bones of the horse; and on this basis they calculated the number of individuals represented in the

entire mass at 2122. Others, however, estimated them at a much higher figure, Professor Toussaint, of the Veterinary School at Lyon, bringing the total up to 40,000 at least.

Of the fauna identified at Solutré, besides the horse and reindeer, the following may be mentioned as evidence of the Palæolithic character of the station:—*Elephas primigenius* (portions of tusks, teeth, and bones in considerable quantity scattered throughout the débris); *Bos primigenius* (fragments of bones scattered about the hearths); *Cervus canadensis* (formerly taken for *Megaceros*) was identified by M. Dupont, who had frequently found remains of this animal in the Belgian caves; *Ursus arctos* (a tooth and some rib-fragments); *Ursus spelæus*, *Canis lupus*, *Canis vulpes*, *Hyæna spelæa*, etc. The mammoth continued, but the woolly-haired rhinoceros disappeared from the chronological horizon of the station. On the other hand, the reindeer and horse, which were feebly represented in the Moustérien epoch, were here met with in great abundance. Throughout a portion of the area within the settlement (and also outside of it) there were some human burials, the bodies lying sometimes immediately over the hearths, but generally at various depths in the débris. Here all the materials were greatly disturbed, pottery and Palæolithic implements being so intermingled that at first it was thought the burials were those of the primary occupants of the station; but subsequent research showed that some were of comparatively recent date, even as late Merovingian times. Although some of the graves were shown by their contents to be of greater antiquity than others, it was impossible to assign any of them to the Solutréen period. Moreover, the cephalic indices of eighteen crania, submitted to Broca for examination, varied from 68.34 to 88.26—an extent of variation which could be better accounted for by a post- than by a pre-Neolithic civilisation (*Association Française*, etc., 1873, p. 651).

On Plate VI. are illustrations of a few typical objects of the Solutréen Age. Nos. 1-4, 6, 7, 10, 11 are from the rock-shelter of Monthaud, situated on the bank of the Anglin, commune de Chalais (Indre), described and illustrated by the Abbé Breuil and Jean Clement (*Mémoires de la Soc. des Antiq. du Centre*, vol. xxix.). Nos. 5, 8, 9, 12-17 are after Ad. de Mortillet (*Musée*



Solutrén Age. Rock-shelter of Monthaud, 1-4, 6, 7, 10, 11 (after Breuil and Clement);
Musée Préhistorique, 5-8, 9, 12-17. (All $\frac{3}{8}$, except No. 16 = $\frac{1}{2}$.)

Préhistorique). Of these objects, No. 4 is an ivory pendant ; 10 and 11 are broken lance or dart points of reindeer-horn ; 1-3 are broken flint blades of the laurel-leaf shape ; 8 is made of agate ; 15 represents the body of a species of deer sculptured in stone (Solutré) ; 16 represents the largest of the unbroken flint blades found in the Volgu hoard (Saône-et-Loire).

Magdalénien.

The rock-shelter of La Madeleine was situated on the right bank of the Vézère, at the base of a limestone escarpment with an almost vertical face, about 5 metres from the river and only 6 metres above its level. It was completely excavated by MM. Lartet and Christy, and the principal relics found are figured in *Reliquæ Aquitanicæ* (1865-75). The most characteristic animal represented in its débris was the reindeer, which shows that the climate had still a sub-Arctic character. The air is supposed to have been dry, and unfavourable to the formation of glaciers. The mammoth, though abundant at the commencement of the epoch, was gradually becoming scarce, and towards its close the extinction of the last of the Palæolithic elephants was a *fait accompli*. From the standpoint of domestic and social economy the dominant features of the Magdalénien epoch were—(1) the prominent place given to the manufacture of all sorts of objects of bone, ivory, and horn, with, of course, a corresponding decline in the flint industry ; and (2) the development of a remarkable artistic talent which manifested itself in the production of works of art in sculpture, engraving, and even painting. It would appear that the people, when not engaged in hunting and fishing expeditions, occupied themselves by manufacturing such tools, weapons, implements, and ornaments as were indispensable to the due performance of their multifarious occupations.

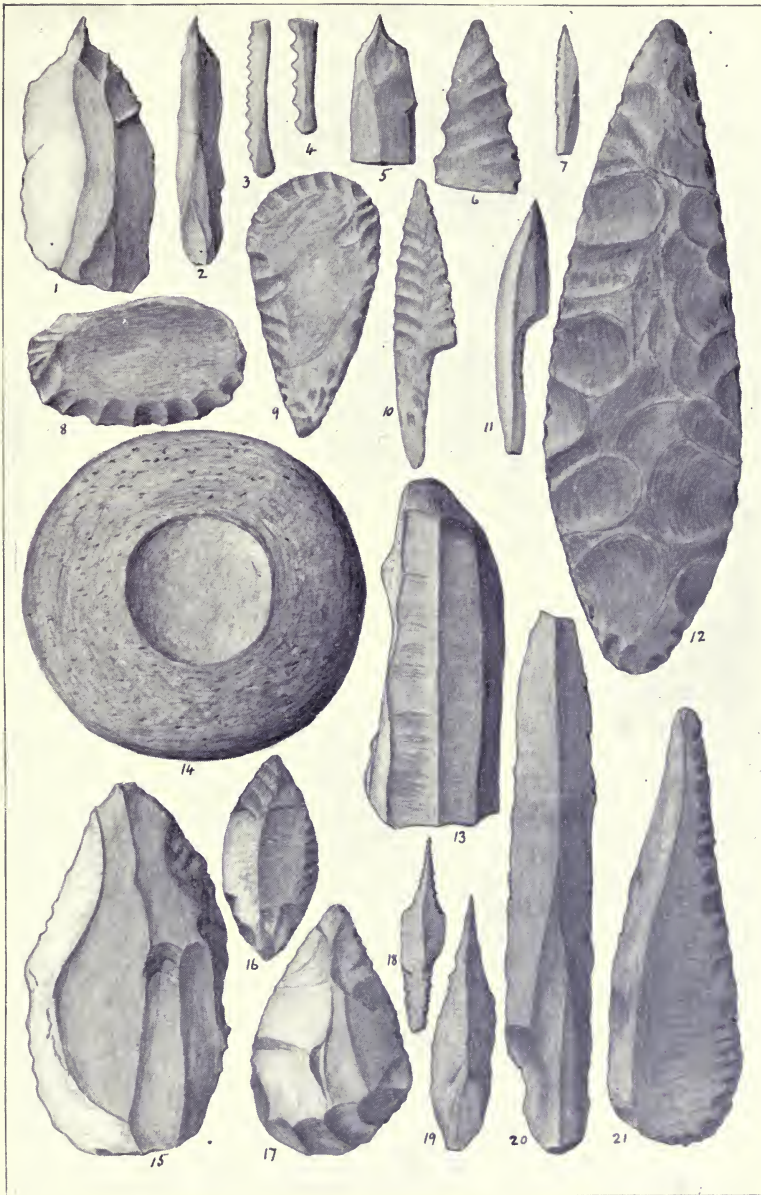
The Magdalénien people started life, as it were, with a working knowledge of the discoveries and mechanical adaptations of their predecessors ; and hence their arts, industries, accomplishments, *et hoc genus omne*, represent the final outcome of Palæolithic culture and civilisation—a subject sufficiently important to require a separate chapter for its consideration. Meantime, I have arranged on Plates VII., VIII., and IX., a

series of objects illustrating the results of the progressive skill of these reindeer-hunters.

Plate VII., Nos. 1 to 7, 9 to 11, 18 and 19, represent saws, borers, scrapers, etc., from the later stations. Nos. 12 and 16 are illustrations of the laurel-leaf blades characteristic of the Solutréen period. The former (Col. Massénat-Girod) was found at Laugerie Basse, and the latter (made of agate) in the Grotte de l'Eglise (Dordogne). Nos. 8, 15, 17 and 21 are specimens of the earlier Moustérien, implements from Le Moustier, and are all trimmed flakes, with the exception of 17, which is a small coup-de-poing. No. 13 represents a core from Les Eyzies, and 20 shows a typical, well-made flake from La Madeleine. A small mortar, made out of a waterworn pebble from Les Eyzies, is shown under Fig. 14; others like it have been recorded from La Madeleine, Laugerie Basse, Bruniquel, and elsewhere.

The figures on Plate VIII. illustrate weapons and ornaments made of bone, deer-horn, teeth, ivory, and shells. Nos. 1 to 14, 15, 17 to 19 (ivory), 20, 25, 26 (fox), 27, and 28 are from La Madeleine (Col. L. and C.). Nos. 5 to 14 are from Laugerie Basse (Col. M.-G.). Nos. 24 and 29, representing a supposed whistle and a sculptured dagger, are also from that prolific station (Col. M.-G.). No. 16 is a thin carved plaque of bone, probably an ornamented pendant, found at Bruniquel (British Museum). Nos. 21 to 23 are from Kent's Cavern. Nos. 12 to 14, 28, and 30 are the bone or horn tips of small lances, probably propelled by such an implement as is figured under No. 8 (Pl. IX.).

Plate IX.—On this plate are various objects illustrating the art of the reindeer-hunters of the Magdalénien period. No. 1 shows a portion of a reindeer-horn with an incised rude representation of a prone man, apparently in the act of throwing a spear at a male auroch. The hands are imperfectly drawn, the body is covered with hair, and a cord, possibly attached to the head of a harpoon, falls behind the legs. This specimen was found at Laugerie Basse (Col. M.-G.). Nos. 2 and 14 are portions of lance-points representing human hands with only four fingers. Nos. 3, 4, and 5 are from La Madeleine (Col. L. and C.). One (3) represents a *bâton de commandement*, having a stag with complex antlers incised on it. Another (4) is a plate of the cannon-bone of a reindeer, with incised figures of bovine animals, which might have been used like Fig. 14, as the paint-box of an artist working in colours. No. 5 represents a truncated dart ornamented with flowers, and what looks like the outstretched skin of a fox. No. 6 is from Les Eyzies, and shows a ruminant having a spear thrust into its breast. No. 7 shows portion of a bevelled dart-head from Laugerie Basse with a sequence of half-fledged birds. No. 8, also from Laugerie Basse, shows a dart-propeller (*propulseur à crochet*), made of reindeer-horn and ornamented with a horse's head and an elongated fore part of a deer. Nos. 9, 10, and 15 (Laugerie Basse) represent the well-extended antlers of a reindeer, an otter eating a salmon, and a hare, sculptured in ivory. No. 11, unmistakably showing the hind portion of a pig, is from the Kesslerloch cave in Switzerland (after Konrad Merk). On the canine of a bear (12), from the cave of Duruthy, a seal is engraved. No. 13 is portion of the palm antler of a reindeer bearing the incised figure of a horned animal, probably intended for an ibex.



Objects Illustrating Flint Industry among the Cavemen of France ($\frac{1}{2}$).

Objects illustrating the progressive civilisation of the Palæolithic cave-dwellers of France.
(For descriptive details, see p. 54.)

CHAPTER III

CAVE RESEARCHES (BRITAIN)

Methods of Investigation. Authenticity of Objects. Kent's Cavern. Windmill Hill Cavern. Cresswell Caves. Hyæna Den of Kirkdale. West of England and Welsh Caves. The Paviland Cave and Human Skeleton. Other Gower Caves. Wookey Hole.

IN lieu of historical data and written records, which are inapplicable to prehistoric investigations, it is desirable to define with some degree of fullness the nature of the methods and arguments on which the high antiquity now claimed for man is founded. This object is best accomplished by an analysis of the following brief narratives of a few of the earliest discoveries of flint instruments before they were recognised by scientific men to be human productions.

Methods of Investigation.

In 1797 Mr John Frere, F.R.S., described at the Society of Antiquaries of London some flint implements, or "weapons," as he called them, found, in association with shells and bones of great animals, at a depth of 12 feet, in brick-earth at Hoxne, in Suffolk. He was so much struck with the situation that he gave a precise account of the circumstances, with sections showing the stratified condition of the superincumbent deposits. He regarded the flint implements, which were turned up in great numbers, as belonging "to a very remote period indeed; even beyond that of the present world." (*Archæologia*, xiii., p. 204).

Mr Frere presented some specimens of the Hoxne implements to the museum of the Society, yet they lay there unheeded till 1859, when Sir John Evans, on his return from a visit to the implement-bearing gravels at Abbeville and Amiens, recognised

them as identical with those in the collection of M. Boucher de Perthes. Another discovery is thus described by Sir John Evans :—

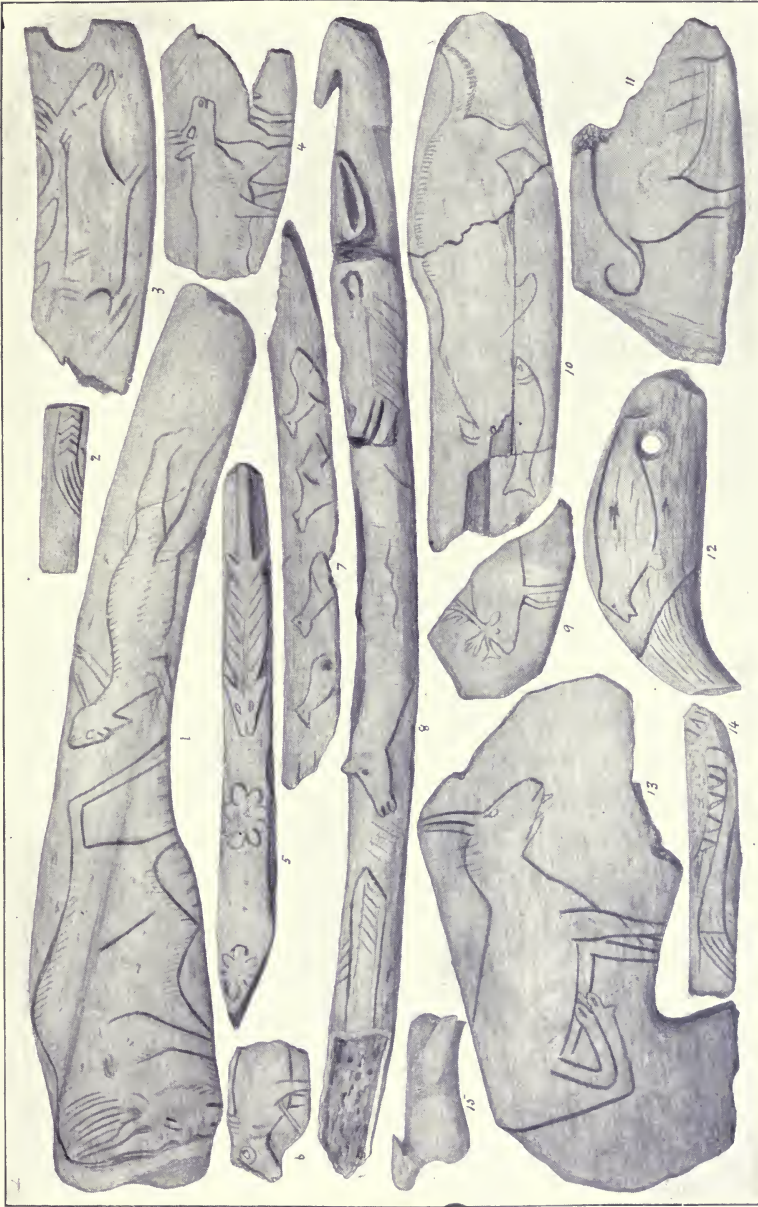
“The Thames Valley may, however, lay claim to the first recorded discovery of any flint implement in the Quaternary gravels, whether in this or any other country. An implement is preserved in the British Museum to which my attention was first directed by Mr A. W. Franks, and which is thus described in the Sloane Catalogue :—‘No. 246. A British weapon found, with elephant’s tooth, opposite to black Mary’s, near Grayes Inn Lane (Conyers). It is a large black flint shaped into the figure of a spear’s point. K.’ (Plate I.). This K. signifies that it formed a portion of Kemp’s collection. It appears to have been found at the close of the seventeenth century, and a rude engraving of it illustrates a letter on the antiquities of London, by Mr Bagford, dated in 1715, and printed in Hearne’s edition of Leland’s *Collectanea*, vol. i., p. 63. From his account it would seem to have been found, with a skeleton of an elephant, in the presence of Mr Conyers.” (*Ancient Stone Implements*, p. 521.)

Nor did analogous discoveries in France fare better. In 1847 M. Boucher de Perthes published a book giving an account of rude flint implements, associated with bones of the mammoth and other extinct animals, which were dug out of the ancient gravel-beds of the Somme; but it remained for upwards of twelve years absolutely ignored. It was not till Dr Hugh Falconer, in the autumn of 1858, visited M. de Perthes’ collection that the French discovery received the attention due to its archæological importance. Dr Falconer, having satisfied himself of the antiquity of the gravels of the Somme Valley and of the genuineness of many of the implements found in them, communicated his opinion to some of his English confrères. This speedily brought Dr Joseph Prestwich and Sir John Evans on the scene, who, after careful examination of all the circumstances, also recognised the real significance of Boucher de Perthes’ discovery. Many French archæologists at once adopted the new view; and at last M. de Perthes had the satisfaction of knowing that his despised flints were not only genuine human implements, but the most



Weapons and Ornaments made of Bone, Teeth, Deer-horn, Ivory, and Shells ($\frac{1}{2}$).

Objects illustrating the progressive civilisation of the Palæolithic cave-dwellers of France.
(For descriptive details, see p. 54.)



Some illustrations of the Art Remains of the Palæolithic Hunters ($\frac{b}{2}$).

Objects illustrating the progressive civilisation of the Palæolithic cave-dwellers of France.
(For descriptive details, see p. 54.)



important evidence in favour of the high antiquity of man that had hitherto come before the scientific world.

The evidential materials in all these discoveries consist of three distinct sets of data, from each of which logical conclusions bearing on the antiquity of Man may be inferred. These are:—(1) The association of bones of the mammoth and other extinct animals with objects made by the hand of man; (2) the characteristics of the manufactured objects; and (3) the position of these remains under stratified drift-deposits. The chronological value of these data is calculable, but the method by which it is ascertained varies in each case. On the supposition that the remains of man and extinct animals, when found together, involve their contemporaneity, the inference that man lived prior to the extinction of the latter is unassailable. Hence the problem resolves itself into one soluble by the palæontologist, viz.—How long since the extinct animal ceased to be a living member of the animal world in that locality? Then again, looking at the implements from the standpoint of type, technique, and style of execution, they can be readily relegated to the time when it was the fashion or custom to manufacture such objects—an inquiry in which the expert archæologist is *au fait*. Lastly, we can appeal to the geologist to tell us the age of the stratified deposits in which the objects were embedded—for such calculations come within his jurisdiction. When the results of these diverse lines of investigation point in the same direction, the evidence for the remote antiquity of Man may become so strong as to be irresistible.

Authenticity of Objects.

While discussing the argumentative side of the question there is one special point which demands a few passing remarks, and that is, the doubt which sometimes arises as to whether an object is, or is not, the work of man's hands. As a mistake on this point may vitiate the whole argument, it is most desirable to have a clear notion of the special characters by which the works of man can be distinguished from natural productions. This is not always an easy matter; and to be an expert on the subject requires a long and careful study of antiquarian collections. Striated pebbles, fantastic petrifications, perforated

stones, stray fossils, flints chipped by the pressure of shifting gravels or falling masses, together with many other odds and ends which may be picked up on an ancient sea-beach, have often been mistaken for the works of man. On the other hand, as we have just seen, successive generations of learned antiquaries have unconcernedly passed over a series of real flint implements without even surmising that they were the productions of human hands, notwithstanding that their discoverers so regarded them. Then we have to make sure of the authenticity of relics.

Kent's Cavern.

It was about the beginning of the second quarter of last century that Kent's Cavern first became a subject of Palæolithic interest, owing to the researches of the Rev. J. MacEnery, who asserted that he found in it flint implements, associated with the bones and teeth of extinct animals, below a thick continuous sheet of stalagmite. But the legitimate inference from these facts—viz., that man was contemporary with these animals and lived before the deposition of the stalagmite, had little chance of being accepted by the public when opposed by the teaching and authority of so famous a geologist as Dr Buckland, author of the *Reliquiæ Diluvianæ* and of *The Bridge-water Treatise on Geology and Mineralogy*.

The facts on which Mr MacEnery based his conclusions were verified by fresh excavations made by Mr Godwin-Austin, F.G.S., in 1840, and afterwards by a committee appointed by the Torquay Natural History Society in 1846. Papers embodying the results of these investigations were read at the Geological Society of London, and at the meeting of the British Association for 1847. But, according to Mr Pengelly, F.R.S., the reception given to these researches was not encouraging, and the inconvenient conclusions arrived at "were given to an apathetic, unbelieving world." (See *Literature of Kent's Cavern*, by W. Pengelly; and Reports of British Association.)

The complete exploration of Kent's Cavern, under the superintendence of Mr Pengelly and a committee of the British Association, was one of the most important events which followed the publication of the works of Darwin, Lyell, Boucher

de Perthes, etc. The investigation was begun on the 28th March 1865, and continued without interruption to the 19th June 1880, at an expense of £1963. (*Brit. Ass. Report*, 1883, p. 556.)

Three distinct strata were detected in the cave in addition to two sheets of stalagmite :—

(1) The surface was composed of dark earth containing mediæval remains, Roman pottery, and objects of iron, bronze, and stone, showing that the cave had been inhabited by man during Neolithic times.

(2) Below this was a stalagmitic floor, 1 to 3 feet thick, covering a reddish deposit known as the cave-earth, which contained a number of industrial relics made of stone, bone, and horn. Among the former were tongue-shaped, ovoid, and triangular tools of flint, together with worked flakes, scrapers, and cores of the same material; also a few hammerstones, one of sandstone being shaped like a cheese (Pl. X., No. 26).

Of bone there were pins, awls, barbed harpoons, and a neatly formed needle (Nos. 11-14 and 31). From the style of workmanship of these objects, especially the harpoons and needle, there can be little doubt that this cave had been occupied by Man as late as the early Magdalénien epoch. A few of the flint implements (Nos. 28-30) may, however, be paralleled with Moustérien types—thus indicating a long period of human habitation. In addition to these relics the cave-earth contained, according to Pengelly, remains of the following animals :—

“The Cave Hyæna was by far the most prevalent form, and his presence was attested, not only by his numerous teeth and bones, but by his coprolites, by bones broken in a manner still followed by existing members of the same genus, and by the marks of his teeth on a very large portion of the osseous remains, including those of his own kith and kin. The next most prevalent forms were the Horse and Rhinoceros. Remains of the gigantic Irish Deer, Wild Bull, Bison, Red Deer, Mammoth, Badger, Cave Bear, Grizzly Bear, and Brown Bear were by no means rare; those of the Cave Lion, Wolf, Fox, and Reindeer were less numerous; and those of Beaver, Glutton, *Machairodus latidens*, and Man were very scarce. So far as it is at present known, the presence of the Glutton is attested by a single os inominatum: *Machairodus latidens*, by five canines and two incisors: and Man by a portion of upper jaw containing four teeth, which together with a solitary tooth was found at the base of the Granular Stalagmite, where it was 20 inches thick.” (*Journal of Plymouth Institute*, February 1875.)

(3) Filling the bottom of the cave was a hard breccia containing remains of bears, together with flint implements of a ruder type than those in the cave-earth.

"The implements," writes Mr Pengelly, "found in the Breccia—the Ursine, or so far as is at present known, the most ancient of the Cavern periods—were exclusively of flint and chert. They were much more rudely formed, more massive, less symmetrical in outline, and made by operating, not on flakes, but directly on nodules, of which portions of the original surface generally remain, and which were probably derived from supra-cretaceous gravels existing in great volume between Torquay and Newton Abbot, about 4 miles from the cavern. . . . The implements were by no means so abundant as those of the Cave-earth; that is to say, a given volume of Breccia did not yield so many implements as on the average occurred in an equal volume of Cave-earth." (*Ibid.*)

Evidently this is the coup-de-poing of French writers, as may be seen from that figured on Pl. X., No. 30, which represents a typical specimen of these earliest cave implements.

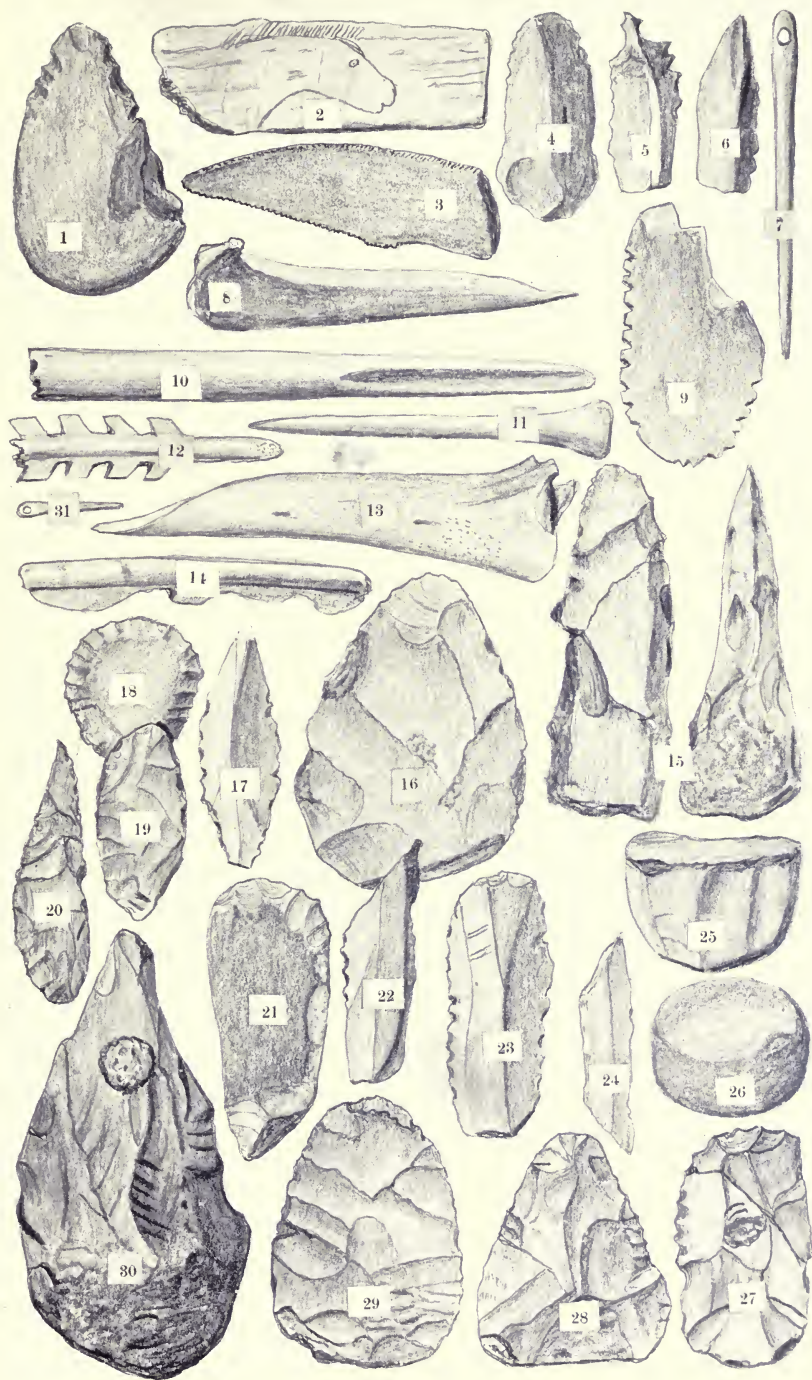
Windmill Hill Cave.

Another discovery of a similar character was the Windmill Hill Cavern, at Brixham, explored in 1858, under the auspices of a committee appointed by the Royal and Geographical Societies of London. The first paper on the result of this investigation was read by Mr Pengelly in September 1858, at the meeting of the British Association then held at Leeds, in which it was announced that "eight flint tools (Pl. X., No. 15) had already been found in various parts of the cavern, all of them inosculating with bones of mammalia at depths varying from 9 to 42 inches in the cave-earth, on which lay a sheet of stalagmite from 3 to 8 inches thick, and having, within it and on it, relics of the lion, hyæna, bear, mammoth, rhinoceros, and reindeer."

This paper, to use the phraseology of Mr Pengelly, produced "a decided awakening," besides indirect results of the highest importance.

Cresswell Caves.

The remarkable discoveries made by the Rev. J. Magens Mello and Professor Boyd Dawkins in the caves of Cresswell Crags, on the north-east border of Derbyshire, are so well known through their description in *Early Man in Britain*



Relics from British Palæolithic Caves. Robin Hood Cave, 1-6, 17; Church Hole, 7-10; Wookey Hole, 16; Brixham, 15, 16, 19; Kent's Cavern, all the rest.

(Nos. 2, 3, 5-14, 16, 18, 21-25, 31 = $\frac{2}{3}$; No. 30 = $\frac{1}{2}$; Nos. 1, 4, 15, 17, 19, 20, 26-29 = $\frac{1}{3}$.)

After Sir John Evans, Boyd Dawkins, and Pengelly.)

[To face p. 60.]



(p. 174, *et seq.*), that it is unnecessary for me to do more than refer to one or two of the most important conclusions arrived at.

The Robin Hood and Church Hole caves may be taken as typical of the group. In excavating from the surface downwards a dark layer of earth, 5 or 6 inches thick, was first encountered, which contained fragments of Roman and mediæval pottery. Beneath this was a combination of stalagmite, breccia, and ordinary cave-earth. At various depths in the cave-earth a number of relics indicating Magdalénien culture was collected, including the following:—Of flint, there were well-formed borers, flakes, engravers, etc. (Pl. X., Nos. 4, 5, and 6); of bone, were a needle, an awl, chisels, a flat piece engraved with the head of a horse, and another with notches cut at the edge (Nos. 7-11). In the lower sandy deposits implements of flint and stone of Moustérien types were met with, including a coup-de-poing of quartzite (No. 1) and an oval implement of the same material with a cutting edge all round, similar to tools found in Kent's Cavern. It is interesting that in the upper cave-earth of the Robin Hood Cave the upper canine of the sabre-toothed lion (*Machairodus latidens*) was found (No. 3). "The results of the exploration of these caves," writes Professor Dawkins, "so far as they bear on the history of man, may be summed up as follows:—In the two lower stages, the hunters are identical with those of the river-drift, while the more highly finished articles, which imply a higher, and probably a different, social condition, appear in the upper series, and are, therefore, later in time." (*Ibid.*, p. 186.)

Another important result was the discovery in the cave, called Mother Grundy's Parlour, of a lower stratum than the lowest ossiferous layer in the other caves, containing remains of hyænas, bisons, hippopotami, and small-nosed rhinoceroses—the last two animals being new to the district. "No implements," writes the Professor, "were found at this horizon, and there is, therefore, no proof that the Palæolithic hunter was a contemporary of these two animals in the district. Nor have the reindeer, the woolly rhinoceros, and the mammoth, so abundant in the other caves of Cresswell Crags, left any trace of their having invaded the district at the time of its occupation

by the leptorhine species and the hippopotamus." (*Ibid.*, p. 187.)

Hyæna Den of Kirkdale.

The cave of Kirkdale was discovered in a limestone quarry in the vale of Pickering during the summer of 1821, and soon afterwards explored by Dr Buckland, who published the result in the following year, in his work entitled *Reliquiæ Diluvianæ*. The entrance to the cave was some 3 feet high and 6 feet wide, and opened into the rock, 20 feet below the surface of the plateau, and 80 feet above the valley bottom. The entrance passage, 5 to 10 feet wide, ran into the rock horizontally, and branched off into a series of side galleries containing some calcareous deposits mixed with the red loam which formed the floor of the cave.

The following is a list of the twenty-three species of animals identified from this cave:—Carnivora—hyæna, tiger, bear, wolf, fox, and weasel. Four Pachydermata—elephant (*E. antiquus*), rhinoceros (*hemitechus*), hippopotamus, and horse. Four Ruminantia—ox, and three species of deer. Four Rodentia—hare, rabbit, water-rat, and mouse. Five Birds—raven, pigeon, lark, snipe, and a small species of duck.

Remains of the hyæna, representing from 200 to 300 individuals, were most abundant; and next to them came those of the ox and deer. From a careful analysis of the evidence, Dr Buckland came to the conclusion that the cave was the den of hyænas; and as no complete skeleton of any of the larger animals had been found, he inferred that the hyænas carried their food piecemeal into the cave, and that its contents had not been disturbed down to the time of its exploration.

West of England and Welsh Caves.

Palæolithic man has left no traces of his presence in the caves of Castleton and Matlock (Derbyshire), the Victoria Cave, near Settle, the famous hyæna den at Kirkdale, nor indeed in any of the bone caves in Britain described by Dr Buckland, with the exception of the cave of Paviland (Glamorganshire). But when Dr Buckland wrote, worked objects of flint of Palæolithic types were not known, or at least not generally recognised to be the product of human hands, so

that, if present, such objects might have been passed over in ignorance of their nature. Since then, however, the presence of Palæolithic man in several of the caves of North and South Wales has been proved by the finding of well-formed flint implements, associated with the osseous remains of extinct animals. Professor Boyd Dawkins informs us that in the cave of Pont Newydd, near St Asaph, in North Wales, "a human molar tooth has been found, as well as a quartzite implement, and rude splinters and chips of quartzite, of the same type as those of the red sand in the caves of Creswell. The pebbles of which these are made have been obtained from the glacial deposits in the neighbourhood. We may therefore conclude with Professor Hughes that the Palæolithic hunter was here after the district was forsaken by the glaciers and the sea, or in other words in post-glacial times, as in the parallel case offered by the river-deposits of Bedford and Hoxne. It must also be remarked that the leptorhine rhinoceros and the hippopotamus, as well as the straight-tusked elephant (*E. antiquus*), bear, bison, reindeer, and horse, are found with the quartzite implements in the Pont Newydd cave, which may therefore be classified with those of Yorkshire and the lower strata in Mother Grundy's Parlour." (*Early Man*, p. 192.)

The Paviland Skeleton.

The cave of Goat's Hole (Gower Peninsula), explored by Dr Buckland in 1823, opens by a wide mouth in face of a cliff 100 feet high, and from 30 to 40 feet above sea-level, and is accessible only at low-water mark. The body of the cave measures 60 feet in length, 20 feet in breadth, and from 25 to 30 feet in height. An irregular chimney-like aperture ascends from the roof and terminates in face of the perpendicular cliff, but too small for the entire carcase of an elephant to have passed down through it. The floor, according to Dr Buckland, was covered with "a mass of diluvial loam of a reddish yellow colour, abundantly mixed with angular fragments of limestone and broken calcareous spar, and interspersed with recent sea-shells, and with teeth and bones of the following animals, viz., elephant, rhinoceros, bear, hyæna, wolf, fox, horse, ox, deer of two or three species, water-rats, sheep, birds, and man. I

found also fragments of charcoal and a small flint, the edges of which had been chipped off, as if by striking a light" (*loc. cit.*, p. 83). Close to a skull and tusks of a mammoth, nearly the entire left side of a human female skeleton lay stretched under a shallow covering of 6 inches of earth.

"The skull and vertebræ," writes Dr Buckland, "and extremities of the right side were wanting: the remaining parts lay extended in the usual position of burial, and in their natural order of contact, and consisted of the humerus, radius, and ulna of the left arm, the hand being wanting: the left leg and foot entire to the extremity of the toes, part of the right foot, the pelvis, and many ribs; in the middle of the bones of the ankle was a small quantity of yellow wax-like substance resembling adipocere. All these bones appeared not to have been disturbed by the previous operations (whatever they were) that had removed the other parts of the skeleton. They were all of them stained superficially with a dark brick-red colour, and enveloped by a coating of a kind of ruddle, composed of red micaceous oxide of iron, which stained the earth, and in some parts extended itself to the distance of about half an inch around the surface of the bones. The body must have been entirely surrounded or covered over at the time of its interment with this red substance."

Dr Buckland then goes on to describe the grave-goods which consisted of the following objects:—"About two handfuls of small shells of the *Nerita littoralis*, in a state of great decay and falling to dust on the slightest pressure," were near the thigh-bone. Near the ribs were forty to fifty fragments of small ivory rods, nearly cylindrical, and varying in diameter from $\frac{1}{4}$ to $\frac{3}{4}$ of an inch, and from 1 to 4 inches in length. Along with these rods were fragments of rings, made of the same ivory, and 4 to 5 inches in diameter—"nearly of the size and shape of segments of a small teacup handle." In another place were three fragments of the same ivory roughly "cut into unmeaning forms by a rough-edged instrument." One fragment was "nearly of the shape and size of a human tongue, and its surface is smooth, as if it had been applied to some use in which it became polished. An instrument made of the metacarpal bone of a wolf, flat, and shaped to an edge at one end, and terminated at the other by the natural rounded condyle of the bone."

According to Dr Buckland, "the ivory rods and rings, and tongue-shaped fragment, were certainly made from part of the antediluvian tusks that lay in the same cave; and as they must have been cut to their present shape at a time when the ivory was hard, and not crumbling to pieces as it is at present on the

slightest touch, we may from the circumstance assume to them a very high antiquity. . . .

“The custom of burying with their possessors the ornaments and chief utensils of the deceased is evident from the remains of this kind discovered everywhere in the ancient barrows; and this may explain the circumstance of our finding with the bones of the woman of Paviland the ivory rods, and rings, and nerite shells which she had probably made use of during life. I am at a loss to conjecture what could have been the object of collecting the red oxide of iron that seems to have been thrown over the body when laid in the grave: it is a substance, however, which occurs abundantly in the limestone rocks of the neighbourhood.”

Dr Buckland's minute description of the interment of the Paviland woman with special sepulchral rites is of exceptional interest in view of the more recent discoveries in the Grimaldi caves of Mentone, the skeletons of Chancelade and Mas-d'Azil (France), of Brünn (Moravia), and other localities throughout Europe. The special feature in these interments which now claims attention, is the fact that though geographically widely separated from each other, the bodies had been covered over with a layer of ochre or peroxide of iron. A variety of this custom was to remove the soft parts (*scarnitura*) before the application of the ochre, a process which accounts for the occasional displacement of the bones from their natural position. But in the case of the Paviland interment this had not been done, as the associated grave-goods were coloured with the same ochreous matter. Seeing that analogous burials have taken place in so many different localities throughout Europe, which are accepted as belonging to the Palæolithic period, is there any valid reason for rejecting the Paviland burial from being ranked in the same category? It is futile, however, in the absence of the skull, to prolong the discussion; so that we must conclude by simply pointing out the precise similarity of the sepulchral rites associated with the Paviland woman to those elsewhere described in Western Europe, especially those of the Grottes de Grimaldi in Italy. Like the Cromagnon race, the Paviland skeleton was that of a very tall person.

Other Gower Caves.

Dr Falconer and Lieut.-col. E. R. Wood (*Antiquity of Man*, p. 173) had investigated a number of caves in the line of

cliffs bounding the rocky peninsula of Gower, in which *Rhinoceros hemitæchus* and *tichorhinus* were associated with *Elephas antiquus* and *primigenius*. In one of these, called Bosco's Den, there were no less than 750 shed antlers of reindeer. In another (Long Hole), the fossil remains included *E. antiquus* and *primigenius*, two species of rhinoceros (*hemitæchus* and *tichorhinus*), bear, lion, hyæna, reindeer, and bison, associated with well-formed flint flakes or knives found at various depths in the cave-earth. Sir Ch. Lyell (*ibid.*, p. 173), after remarking that that was the first well-authenticated instance of the occurrence of *R. hemitæchus* in connection with human implements, comments as follows on these discoveries :—

“Dr Falconer announced in 1860 his opinion that the filling up of the Gower caves in South Wales took place after the deposition of the marine boulder clay, an opinion in harmony with what we have since learnt from the section of the gravels near Bedford, where a fauna corresponding to that of the Welsh caves characterises the ancient alluvium, and is shown to be clearly post-glacial, in the sense of being posterior in date to the submergence of the Midland Counties beneath the waters of the glacial sea. In the same sense the late Edward Forbes declared in 1846 his conviction that not only the *Cervus megaceros*, but also the mammoth and other extinct pachyderms and carnivora, had lived in Britain in post-glacial times. The Gower caves in general have their floors strewn over with sand, containing marine shells, all of living species; and there are raised beaches on the adjoining coast, and other geological signs of 'great alteration in the relative level of land and sea, since that country was inhabited by the extinct mammalia, some of which, as we have seen, were certainly coeval with Man.” (*Ibid.*, p. 174.)

Wookey Hole.

The famous Hyæna Den of Wookey Hole, situated on the south side of the Mendips, was discovered about the year 1849 while cutting a canal along the edge of the rock for the purpose of supplying a paper-mill with water from the Axe. In the course of this operation the cavern, choked up to the roof with ossiferous loam, was exposed. It consists of a chamber attached to a bifurcated passage, one of the ends of which runs into a vertical opening or chimney. The cave has been repeatedly investigated, and for the results we are chiefly indebted to Dr Boyd Dawkins, who writes as follows :—

“The remains obtained in 1862-3, from three to four thousand in number, afford a vivid picture of the animal life of the time in Somerset. They belong to

the following animals, the numbers representing the jaws and teeth only, and the implements :—

| | | | |
|------------------------|-----|-----------------------------|-----|
| Man | 35 | Woolly Rhinoceros | 233 |
| Cave-Hyæna | 467 | R. hemitœchus | 2 |
| Cave-Lion | 15 | Horse | 401 |
| Cave-Bear | 27 | The Great Urus | 16 |
| Grizzly Bear | 11 | Bison | 30 |
| Brown Bear | 11 | The Irish Elk | 35 |
| Wolf | 7 | Reindeer | 30 |
| Fox | 8 | Red Deer | 2 |
| Mammoth | 30 | Lemming | 1 |

“The remains of these animals were so intermingled that they must have been living together at the same time. They lie large with small, the more with the less dense, and are not in the least degree sorted by water. There is no evidence of the hyæna succeeding to the cave-bear or the reindeer to the urus, or that the bears came here to die, as in some of the German caves, or that the herbivores fell or were swept into open fissures, and left their remains, as in the caves of Hutton and Plymouth. On the contrary, the numerous jaws and teeth of hyæna, and the marks of those teeth upon nearly every one of the specimens, show that they alone introduced the remains that were found in such abundance. And they preyed not merely upon horses, uru and other herbivores, but upon one another, and they even overcame the cave-bear and lion in their full prime.” (*Cave Hunting*, p. 310.)

As evidence of human habitation, there were found bone ashes, two rudely fashioned arrow- or lance-heads of bone (now lost), and a few flint implements. One of the finest specimens of the latter (Pl. X., No. 16) is a thin, oval-shaped implement, chipped on both sides, and resembling one found in Kent's Cavern (No. 29), both being small specimens of Acheuléen types which might be assigned to the Moustérien epoch. Habitable floors containing layers of album græcum were both above and beneath the stratum in which the flints were found, showing that hyænas and man alternately occupied the cave.

CHAPTER IV

CHRONOLOGICAL PROBLEMS AND LAND OSCILLATIONS

Introductory. Station of Veyrier. Cave of Béthenas. Cavern of Freudenthal. Kesslerloch Cave. Schussenried Open-air Station. Schweizersbild. Land Oscillations. Hoxne Brick-earth. General remarks.

As the units of absolute time, like the elements of history, are inapplicable to prehistoric materials, especially those dating back to the Palæolithic period, anthropologists have from time to time suggested various natural phenomena on which chronological sequences may be founded, with the view of furnishing more or less precise ideas regarding the antiquity of man. The most common data thus improvised consist of some selected physical phenomena which can be shown to have been concurrent, or to have some incidental connection, with relics of man. Thus, the rate at which the Falls of Niagara are receding; the growth of peat and increase in stalagmitic deposits; the deposition of sedimentary strata of river deltas, such as the cone of Tinière and the Nile delta; the correlation of astronomical phenomena with climatal changes in the environment, etc., have been largely discussed with the view of abstracting from their details some definite points which can be correlated with the developmental stages of man's career on the globe. But of all the evidential materials hitherto advanced from this standpoint the most reliable are to be found among glacial phenomena.

We have already adverted to the fact, that the implements of the river-gravels of England are precisely similar, both in type and technique, to those of analogous deposits at Chelles and the valley of the Somme; and that consequently they must be regarded as belonging to the same period and same civilisation. The oldest deposits in Kent's Cavern, the Grotte de Spy,

and the cave of Le Moustier, contained a few implements of the coup-de-poing type. Hence these and probably some other stations are to be assigned to the close of the interglacial warm period, viz., that which succeeded the maximum Ice Age which deposited the boulder clay in England. It was then that the caverns of Europe were for the first time utilised by man as regular places of abode, owing to the increasing coldness of the environment. The subsequent glacial period, although of Arctic severity, was not attended by such a large deposition of ice as the previous one, because the atmosphere contained less moisture; and it was during it that the reindeer-hunters of the Dordogne and other contemporary stations developed their remarkable civilisation. That the Reindeer Age of France was long subsequent to the maximum ice advance, is proved by the number of Palæolithic stations of the Magdalénien epoch which have been discovered within areas formerly occupied by glaciers. Thus, the stations of Kesslerloch, Freudenthal, Schweizersbild, and Schussenried are within regions which at one time had been covered by the Rhine glacier; while the stations of Veyrier, in Switzerland, near Geneva, Scé, near Villeneuve, Balme and Béthenas (Isère), are within the area formerly occupied by the Rhone glacier. The same remarks are applicable to some of the stations in the vicinity of the Pyrenees. A few of the above-named stations will now be described, by way of showing the complete parallelism between their relics and those of the Magdalénien epoch.

Veyrier, in Savoy.

At the foot of Mont Salève, near the village of Veyrier (Haute-Savoie), and not far from the Swiss frontier, some caverns formed by immense fallen rocks were recognised, as early as 1835, to have been a station of prehistoric people. M. Thioly (*Revue Savoisiennne*, 1868; *Mémoires de l'Académie de Savoie*, 2nd ser., tome xii.) excavated one of these, and it was found to measure 8 metres long, 5 metres broad, and 2 metres high. The débris of habitation formed a blackish layer 0.40 metres thick, and in it were found knives, scrapers, and pointers of flint (Fig. 15, Nos. 8 to 11), hammer-stones of Alpine pebbles, some perforated shells and teeth (Nos. 6 and 7).

a well-formed sewing-needle (No. 5), and lance points of bone (Nos. 3 and 4), together with portions of reindeer-horn cut and sawn for various purposes. The most noteworthy object is a so-called *bâton de commandement*, ornamented on both sides (Nos. 1 and 2). Among the fauna the most common animal represented was the reindeer. From these facts it is clear that the station falls under the Magdalénien epoch.

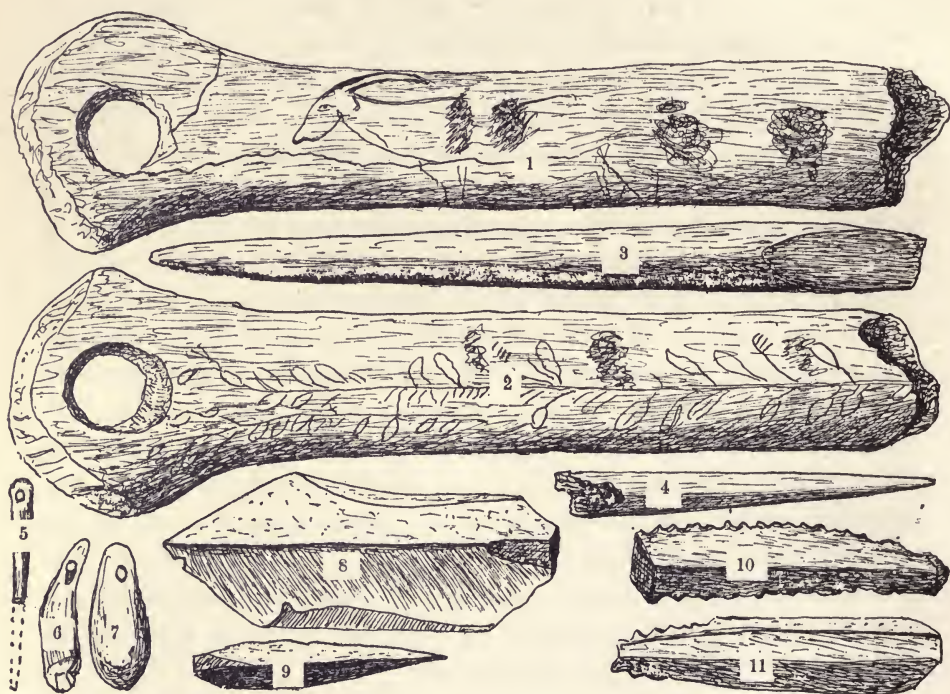


FIG. 15.—Objects found in the Station of Veyrier, near Geneva (all $\frac{2}{3}$). (After Thioly.)
(For details, see p. 69.)

No deposits, glacial or otherwise, covered these rocks; consequently the station was inhabited by man subsequent to the melting of the ice, and long posterior to the time when the Rhone glacier occupied the locality to a depth of some 3000 feet.

Another station of the same period as Veyrier was announced in 1870 by M. H. Saussure (*Bibliothèque Universelle*), as having been discovered in the Grotte de Scé, near Villeneuve, and actually within the basin of the Lake of Geneva. Both





FIG. 1.—Reindeer on a portion of Reindeer-horn (†).

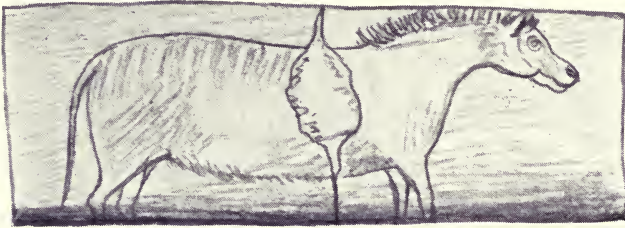
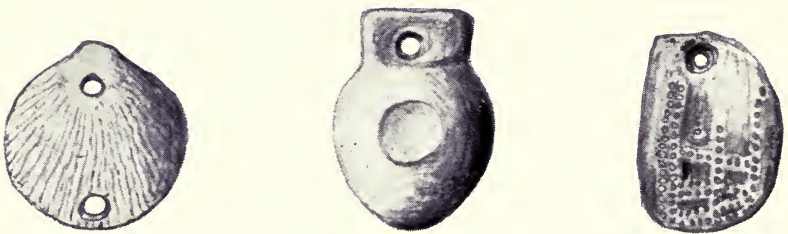


FIG. 2.—Drawing of a Horse on portion of Reindeer-horn (†).



FIGS. 3, 4, 5.—A Perforated Shell and Hanging Ornaments made of Coal (†).

Engraved Figures of Animals and Ornaments from the Kesslerloch Cave, near Schaffhausen.
(After Conrad Merk.)

the relics and fauna are characteristic of the Magdalénien epoch.

Bones of the reindeer are also said to be found in the ancient alluvial deposits which border the lake between Veyrier and Scé, at a height of from 20 to 25 metres above the present level of the water. These remains, without being associated with the industrial relics of man, have been met with at Saint Prex, Lutry, and Cully—showing that the reindeer in a wild state inhabited the district after the melting of the great Rhone glacier.

Cave of Béthenas.

In the year 1866, M. Chantre, while excavating in the lower cave of Béthenas (Isère), a locality within the glacial area, came upon remains of a human skeleton, associated with the bones of badger and fox, and one good specimen of a flint knife. These objects were found, at the depth of 1 metre, in

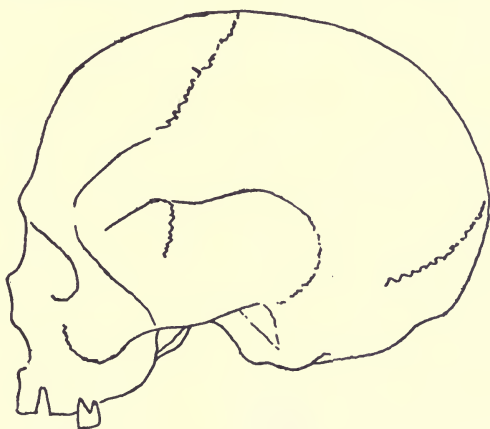


FIG. 16.—Skull found in the Cave of Béthenas (Isère). (After Jarricot.)

yellow mud (limon), with which the cave was filled. The proprietor, who had previously removed some of the yellow earth from the cave, informed him that he had disinterred several human skeletons near the entrance at a depth of 2 metres below the surface, but of which he had only retained one skull (Fig. 16), which he then handed to M. Chantre. M. P. Gervais, who then described the skull as brachycephalic (*Zoologie et Paléontologie Générale*, p. 114), thought it belonged

rather to the age of the lake-dwellings than to that of the reindeer—an opinion which was accepted by M. Chantre at the time.

In 1873 Chantre submitted the skull to Paul Broca, at the meeting of the French Association then held at Lyons, and he pronounced it to be of the Magdalénien epoch, and dolichocephalic.

M. Hamy writes as follows about it :—

“Voici le crâne dont j'ai parlé et qui m'a été confié par M. Chantre. Il est dolichocéphale et remonte à l'époque de la pierre-polie. Je ne crois pas que ce soit un crâne celtique. J'en ferai l'examen dans la première séance.” (*Bull. de la Soc. d'Anth. de Paris*, 1868, p. 599.)

Such being the discordant views held about the Béthenas skull, M. Jean Jarricot, Secretary of the Anthropological Society of Lyons, has reinvestigated the whole matter (*ibid.*, 1908, pp. 103-139), and finds, after an elaborate series of comparative measurements, that it comes anatomically nearest to that of Chancelade, the cephalic index of which, according to Testut, was 72.02, while that of Béthenas was found by Jarricot to be 77.24.

The essence of M. Jarricot's results may be thus stated :—

- (1) The circumstances in which the skull was found do not permit of assigning it to any definite epoch.
- (2) Its osteological characters show that it is allied, on the one hand to Palæolithic, and on the other to Neolithic races.

Cavern of Freudenthal.

The cavern of Freudenthal, near Schaffhausen, excavated by Dr H. Karsten in 1874, has yielded a number of human bones ; but they are so broken and decayed that a description of them would be of no archæological value. They consist of :—(1) a fragment of the parietal bone. (2) The lower jaw of a person of about 16 to 19 years of age. (3) Fragments of skulls, mandibles, and pelvis. These were found in a bed of brown loam in association with remains of reindeer, cave-bear, brown bear, horse, and mammoth. No representations of animals are recorded from the station, but the ordinary relics of Magdalénien types were in abundance. (*Bull. Soc. d'Anth.*, 1907, p. 211.)

Kesslerloch Cave.

The cave known as Kesslerloch, so called because it has been a frequent place of resort of travelling tinkers, is distant some ten minutes from Thayngen, and a little more than a quarter of an hour by railway from Schaffhausen, on the line to Constance. In 1873 the school children of Thayngen, under their teacher Conrad Merk, made a botanical excursion to the neighbourhood, and while searching for rare plants, discovered bones and flint implements in the cave. This discovery led to its excavation by Mr Merk, under the auspices of the Schaffhausen Natural History Society. The results, which turned out to be exceptionally valuable, were published as an illustrative monograph in the *Proceedings of the Antiquarian Society at Zurich* for 1875.¹

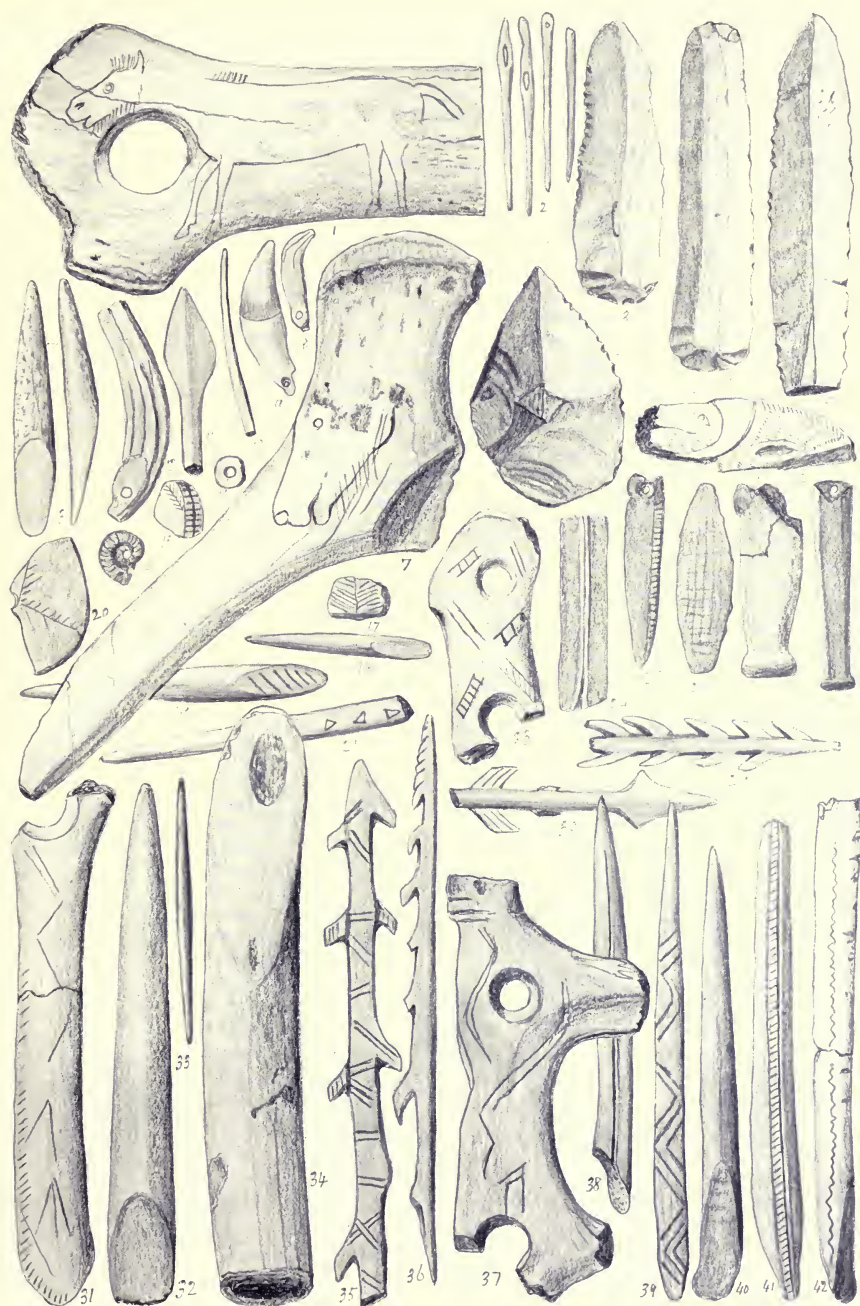
The cave opens by two entrances in face of a steep wall of white limestone rock, the last outpost of the Swiss Jura. The largest opening is 41 feet wide, and $11\frac{1}{4}$ feet high, and extends inwards for about 51 feet; but these dimensions become rapidly smaller in the interior, so that at 25 feet from the opening the breadth is only 31 feet, and the height only 6 feet. The area actually covered by the cave is about 2000 square feet. The uppermost bed consisted of a mass of rubbish formed of large and small angular stones, like the rocks on either side. This bed is thickest in front, where it amounted to from 47 to 55 inches, probably owing to its greater exposure to atmospheric influences, but in the inner recesses it was reduced to a few inches. Beneath the superficial rubbish came the first relic bed, which varied in thickness from 4 to 15 inches, and was composed of a black material containing relics and a mass of bones. On this bed, and partly embedded in it, were two large patches of stalagmite from 12 to 18 inches thick, both of which contained on their underside some bones and flints. Underneath the black relic bed there was another deposit, coloured red with oxide of iron, and extending over the whole of the cave, which also contained bones and relics.

¹ An English translation of Mr Merk's work was issued in the following year by Mr Lee, the translator of Keller's *Lake-dwellings*.

The bones in this stratum were better preserved than those in the upper relic bed, as the soil was always damp. The thickness of this second relic bed varied from $2\frac{1}{4}$ to 14 inches. Below this was a deposit of yellow loam containing neither bones nor relics, except a few which become embedded on its surface, thus proving that man was the first occupant of the cave.

Judging from the number of flakes and chips collected, the flint industry must have been very considerable; but the worked objects, chiefly knives, were small, none of them exceeding 4 inches in length. The bone relics, of which about one hundred specimens were collected, are quite Magdalénien in form and ornamentation. Among the drawings of animals are one or two figures of horses, as well as the famous one of the browsing reindeer, incised on a piece of reindeer-horn. The latter is figured on Plate XI., Fig. 1. The other figures on this plate represent a horse drawn on a portion of reindeer antler, a perforated shell, and two ornaments made of coal. For comparative purposes, I have reproduced (Pl. XII.) a number of the most important relics found in the Kesslerloch, from which it will be seen that the civilisation of its inhabitants is a complete parallel to that of the reindeer period in the Dordogne district. Among the more interesting objects are portions of reindeer-horn, the so-called *bâton de commandement*, variously ornamented (1, 7, 23, 31, and 37); bone needles (2); flint knives (3 to 6); pendants, or as Mr Merk calls them, earrings made of coal (24 to 28); perforated teeth (8, 9, and 12); objects of stone variously ornamented, one being a perforated fossil ammonite (14 to 17); an ornamented bone plaque (20); a curiously carved head of an animal supposed to represent the musk-ox (22). This piece of sculpture is unsymmetrical, the ear and eye of one side being on a different level from those on the other side; the nose is altogether wanting. One other piece of sculpture, representing the head of a horse, was found, but it is very imperfectly preserved. The rest of the objects on the plate consist of variously shaped and ornamented chisels, lance-heads, and harpoons.

The osseous remains were assigned by Rutymeyer to twenty-eight species, as shown by the annexed tabular state-



Kesslerloch Cave (all $\frac{1}{2}$). (After Conrad Merk.)



ment, which also indicates approximately the number of individuals represented :—

TABLE OF THE FAUNA.

| | | Individuals. |
|-------------------------------------|--|--------------|
| Extinct Animals | { 1. Cave-lion | 3 |
| | 2. Mammoth | 4-6 |
| | 3. Rhinoceros | 1-2 |
| | 4. Urus | 1 |
| | 5. Reindeer | 250 |
| | 6. Glutton | 4 |
| | 7. Arctic Fox | 3 |
| | 8. Chamois | 1 |
| | 9. Ibex | 1 |
| | 10. Alpine Hare | 500 |
| | 11. Marmot | 1 |
| | 12. Wapiti (?) | 1 |
| | 13. Red Fox | 40-50 |
| | 14. Ptarmigan | 80 |
| | 15. Wisent | 6 |
| | 16. Red Stag | 6 |
| | 17. Bear | 2-3 |
| | 18. Lynx | 3 |
| | 19. Wild Cat | 1 |
| | 20. Wolf | 17 |
| | 21. Wild Swan | 1 |
| | 22. Wild Goose | 2 |
| | 23. Sea Eagle | 1 |
| | 24. Common Fox | 2-3 |
| | 25. Field Hare (?) | 2 |
| | 26. Raven | 3 |
| | 27. Dog (?) | 1 |
| | 28. Horse | 20 |
| Animals withdrawn from the district | { To the North | |
| | To the Alps | |
| | To America | |
| | To the North and the Alps | |
| | To the adjoining districts and countries | |
| Still living in district | | |
| Domesticated | | |

Schussenried, Wurtemberg.

The Palæolithic station of Schussenried was situated on the watershed of the extensive plateau which separates the valley of the Danube from the lake basin of Constance. The whole district, especially on the Danubian slope, is covered by a thick mantle of peat. In 1865, workmen engaged in cutting a canal 4 metres or more in depth, to rectify some changes at the source of the river Schussen, turned out large quantities of bones and antlers, which they took to be those of ordinary deer. Some of these fell into the hands of M. Vallet, a chemist in the village of Schussenried, and were preserved at his residence as curiosities. Professor Krauss of Stuttgart, who happened to be in the neighbourhood, on seeing these bones and horns at

once recognised them as remains of the reindeer, and sent some specimens to Dr Fraas at Stuttgart. Investigations were at once undertaken by the Government, and carried out under the superintendence of Dr Fraas and M. Hassler, Royal Conservator of the Antiquities of the Kingdom of Wurtemberg.

The height of the peaty plateau above sea-level at the source of the Schussen (which flows into Lake Constance) is 575 metres; and its depth varies from 4 to 5 metres. Below the peat was a bed, about a metre in depth, composed of sand and calcareous matters mixed with the detritus of an underlying moraine. When the fine sand of this layer became infiltrated with the calcareous waters, it became hardened, and exhibited a variety of brown and ochre tints.

The next geographical stratum was the moraine of unknown depth, consisting of the usual mixed materials—sand, clay, striated stones, etc. Intercalated between the moraine and the calcareous deposits was an archæological stratum, composed of an immense quantity of broken bones, reindeer-horns, flint implements, worked objects of bone and horn, ashes, charcoal, and other refuse of human habitation. This heterogeneous mass lay in a hollow, covering about 106 square metres, which Dr Fraas believed to have been artificially scooped out by the occupants of the station. A remarkable feature of its contents was the presence here and there of thin layers of Arctic mosses, the predominant species being *Hypnum sarmentosum* and *Hypnum grœnlandicum*. Dr Fraas thinks that it was to the influence of these mosses that so many bones and horns were preserved, as in other parts of the débris where they were not present the osseous remains were very much decayed.

Of the fauna represented, the reindeer was by far the most abundant, the number of individuals being estimated at several hundreds. Out of these bones a complete skeleton had been constructed (though, of course, not the bones of one individual), which now adorns the Stuttgart Museum. The other animals represented by their bones were the horse, ox, hare, and (very sparingly) the glutton, bear, wolf, Arctic fox, and swan. The absence of the dog and red-deer may be noted.

More than six hundred flint objects, mostly in the form of lance-heads and knives, were found, chiefly in the lower strata,

near the moraine, and it has been remarked that the raw material must have come from a considerable distance. Other stones were utilised as hammers, etc. Plaques of schist, blackened by fire, were supposed to have been used for cooking morsels of flesh.

A well-shaped needle made of oak wood and others of bone, also a whistle made of a foot-bone of the reindeer, were noted among the industrial remains. Horns of the reindeer sawn into pieces were used as implements and handles, among the former being harpoons and a perforated *bâton de commandement* without ornament. Pieces of a red substance were supposed to be used to paint the person.

All the relics were worn out and apparently thrown aside as being no longer usable, and the bones and skulls were broken for their marrow, from which it would appear that the establishment was conducted on economical principles.

The Schussenried station is important not only as representing the reindeer period in its purer form, but as an illustration of open-air habitation superimposed on the terminal moraine of the Rhine glacier. How far this glacier had retreated when the reindeer-hunters took up their abode on its morainic débris it is impossible to say. Although the climate was then of Arctic severity, there were no glaciers in the vicinity of Schussenried, and there being no caves to protect the hunters, they were forced to construct some kind of shelter. From the circumscribed area in which the relics were located it is not unreasonable to suggest that a timber house stood over the site, but of which there was no evidence on account of the complete decay of the wood. (The station is described in the *Congrès International*, etc., for 1867 and 1869, by M. Albert Steudel and Dr Fraas, pp. 147 and 286; also in *Archives de la Bibliothèque Universelle*, 1867, p. 31.)

The Rock-shelter of Schweizersbild.

The Schweizersbild is situated in a small valley of the same name, about 2 miles north of Schaffhausen, and within 4 miles of the famous Kesslerloch Cave. The special features which induced man to take up his abode in this locality were due to the protection afforded by an isolated limestone rock which

protrudes through the meadow-land. It rises to the height of 16 metres at its highest point, and presents an abrupt face looking southwards. At the present time this rocky wall is only slightly overhanging, but this feature, owing to long-continued disintegration, is probably less striking than it was in earlier times. Roughly speaking, it is a concave hollow, approximating along its base to a semi-ellipse, the major axis of which measures 36 metres, and the greatest distance of the rock from this line is 12.5 metres. The semi-elliptical area thus defined covers 207 square metres, and the gradual accumulation of débris over its floor, partly from the disintegration of the overhanging rocks, and partly from vegetable mould and other sub-aerial causes, had raised its surface to 2.5 metres above the surrounding plain. Dr Nüesch informs us that during the day the heat within a few yards of the wall was almost unendurable, on account of the reflection of the sun's rays from the surface of the limestone rock; and hence he inferred that the shelter would remain free from snow in the winter time. Its elevation above the sea is 472 metres, and as it occupies the watershed of the valley, it was not subject to flooding. These topographical and natural advantages rendered the rock-shelter of Schweizersbild a common rendezvous to the hunters of all ages. The discovery of this fact by Dr Nüesch in 1891 induced him to have it thoroughly and systematically explored.

Although these explorations were finished in 1893, it was not till 1897 that the final results were given to the world, the delay having risen partly from the vast amount of material to be examined, and partly owing to the severe illness of the author. The work now published is enhanced by the fact that all the relics collected have been examined and reported on by specialists. Besides the explorer's description of the archaeological discoveries, the work contains articles by ten other contributors, the whole forming vol. xxxv. of the *Neue Denkschriften der allgemeinen schweizerischen Gesellschaft für die gesammten Naturwissenschaften*.

The names of Professors Th. Studer, A. Nehring, and J. Kollmann, who have between them exhaustively treated of the fauna, are a sufficient guarantee that we have here set before us the most trustworthy results that modern science can produce.

Professor Nehring, who has made a special study of the characteristic fauna of the Arctic and sub-Arctic regions under the names of *Tundra* and *Steppe fauna*, finds that a corresponding series of animals formerly existed in the regions around Schweizersbild, both of which were superseded by a forest fauna, thus indicating that a gradual change from an Arctic climate and fauna to those of the present day has taken place since man appeared in the district—a transformation which is fully borne out by the stratigraphical arrangement and contents of the deposits. Accordingly, we find the deposits which yielded these different remains characterised as Tundra, Steppe, Forest, and Domestic fauna, as illustrated by the following tabular statement :—

| Deposits. | Depth in centimetres. | Age in years. | Characteristic fauna. |
|---|-----------------------|---------------|---|
| (1) Humus bed . . . | 40-50 | 4,000 | Domestic fauna, Iron and Bronze Ages. |
| (2) Grey relic bed . . . | 40 | 4,000 | Forest and lake-dwelling fauna of the Neolithic period. |
| (3) Breccia bed. This deposit had a thin layer of dark earth, some 10 centimetres thick, about its middle, called upper Rodent bed. | 80-120 | 12,000 | Forest fauna: transition from the previous (<i>Steppe fauna</i>). |
| (4) Yellow relic bed . . . | 30 | 3,000 | Sub-Arctic fauna (<i>Steppe fauna</i>). |
| (5) Lower Rodent bed . . . | 50 | 5,000 | Arctic fauna (<i>Tundra fauna</i>). |
| (6) Gravel bed (glacial deposits) | 150 | ... | No relics. |

The following notes may serve to give some general idea of the industrial remains of man found in these deposits, as well as of a few of the fauna associated with them; but they are utterly inadequate to convey to your minds the great ability and fullness with which all the details have been worked out.

The lowest stratum, according to Professor Penck, is a fluviatile deposit of the last glacial epoch in Switzerland, formed just as the ice was finally retreating from the valley. It was dug into to the depth of 1.5 metre without reaching the bottom, but, as it contained no human relics, it is of no special importance beyond determining its geological character. Subsequently, when the locality became dry, man frequented the rock-shelter, and the lower Rodent bed, No. 5, began to accumulate.

This layer was composed of yellowish earth, mixed with fragments of limestone from the overhanging rocks. Throughout its whole depth, but sparsely scattered, were found various implements of flint and worked objects of bone and horn, such as needles, harpoons, awls, chisels, etc., all of which were recognised as characteristic relics of the "reindeer period." It may also be noted that all the mammalian bones were broken for their marrow. Burnt bones were rare, and only one fire-place with ashes was encountered; so that, upon the whole, it appeared to have been only occasionally visited by man.

The chief interest of the layer, however, centred on its organic contents. The characteristic fauna of the Tundra, according to Professor Nehring, are the following:—Banded lemming, Obi lemming, Arctic fox, mountain hare, reindeer, and musk-ox. With these are frequently associated a number of animals of more or less migratory habits, such as northern vole, water-rat, glutton, ermine, little weasel, wolf, fox, and bear. Now the extraordinary fact is brought out, that of these fourteen species only the Obi lemming and the musk-ox are unrepresented in the lower Rodent bed of the Schweizersbild. The latter was, however, found in Kesslerloch Cave, in the vicinity. It appears that the banded lemming (*Myodes torquatus*) and the Arctic fox are the two most persistent animals of the Tundra fauna, and their presence in the rock-shelter is alone sufficient proof that the climate of the period was of an Arctic character. In the upper portion of this deposit relics of new animals began to appear, indicating a change to a sub-Arctic climate. But these found their highest development in the next succeeding layer, viz., the Yellow relic bed, No. 4.

The colour of this deposit was due to a mixture of yellow loam, a large number of yellow-stained bones, and some stones reddened with the action of fire. It lay immediately over the rodent bed, but in some places, where the latter was absent, it rested on the glacial gravel bed. Evidence of man's presence was now greatly multiplied. Anvils, half-buried in flint chips, wasted flint implements, hearths and stones cracked and reddened by the action of fire, layers of ashes, broken bones, bits of charred wood, pieces of worked and unworked lignite, a large number of implements made of bone, horn, and flint,

together with some specimens of the characteristic art of the reindeer-hunters, are the salient features of this relic bed. A somewhat rare piece of art is a stone tablet having the outlines of a wild ass and of a reindeer incised upon it. To show how D. Nüesch manipulates his statistics we may quote the following items :—

Fourteen thousand worked flints, 180 fragments of bone needles, 41 reindeer whistles, 42 pierced ornaments made of shells and teeth of the Arctic fox and glutton, etc. The whole collection of relics from this layer is typical of the latest phase of Palæolithic civilisation, such as have been found in the reindeer caves of the Dordogne, and the Kesslerloch Cave of the neighbourhood.

The fauna has undergone a considerable change by the disappearance of some animals, such as the banded lemming and a number of others; while, on the other hand, new ones have taken their place, all of which changes indicate, according to the above eminent authorities, a sub-Arctic climate.

The next layer is the Breccia bed, No. 3, which contains, about its middle, the upper Rodent bed. During this period there is a gradual transition to a forest fauna, the various species of which appear to be of a somewhat mixed character. The climate has become mild and damp, and more favourable to arborescent growth. Man's presence was indicated by ashes, worked flints, split bones, but no implements of bone or horn were found in this layer. Dr Nüesch thinks that only small groups of reindeer-hunters occasionally visited the shelter during this period.

In the next layer (Grey relic bed, No. 2) we are among the remains of Neolithic civilisation, attested not only by an assortment of characteristic objects, but also by the fact that the rock-shelter now became a cemetery, and contained no less than twenty-two interments. The graves were dug into the underlying Palæolithic deposits. Ten of them contained the remains of children. The fourteen adult skeletons reported on by Professor Kollmann show that they belonged to two distinct races, one being of fair size, 1600 mm. (5 feet 3 inches) and more, and the other much smaller—in fact, a race of pygmies.

Dr Nüesch thinks that the rock-shelter was then no longer inhabited by man, but only visited by him for the purpose of burying, or perhaps cremating the dead—an idea suggested by the large quantity of ashes it contained. The reindeer was now scarce in the district, and its place was taken by the red-deer. It was a true forest fauna, of which the following animals were represented in Schweizersbild:—Brown bear, badger, marten, wolf, fox, wild cat, mole, hare, beaver, squirrel, hamster, water-rat, urus, *Bos longifrons*, goat, sheep, stag, roe, reindeer, wild boar, horse, and ptarmigan. Among these, the newcomers were badger, wild cat, hare, urus, *Bos longifrons*, goat, and sheep; while of those animals which were represented in Palæolithic times, the following are wanting:—Manul cat, Arctic fox, ermine, weasel, glutton, spider, musk-shrew, field vole, red suslik, pica, Alpine hare, bison, ibex, maral deer, wild ass, and all the birds with the exception of ptarmigan. In short, the Steppe fauna had in its turn given way to a forest fauna, and, synchronous with these changes, Palæolithic man and the reindeer gradually vanished from the district. Dr Nüesch, with the assistance of his collaborateurs in this great work, has clearly demonstrated that Tundra, Steppe, Forest, and Domestic fauna have succeeded each other in chronological sequence in North Switzerland.

I do not regard the chronological deductions founded on the investigations at the Schweizersbild as data on which absolute reliance can be placed, as from the very nature of the subject precision is unattainable. This Dr Nüesch fully admits, and, indeed, he himself has advanced several considerations which might considerably reduce his highest estimate (29,000) years of the time since man began to frequent the neighbourhood—as, for example, that conclusive evidence of the presence of man in the lower Rodent bed was not found till near its middle. But, after all allowances for possible errors are made, he thinks the date of man's first appearance in the district cannot be less than 20,000 years ago. One thing, however, is certain, as the explorer pertinently remarks, that hundreds of thousands of years cannot have elapsed since the Reindeer period and its civilisation flourished at the Schweizersbild.

Land Oscillations.

That the lands of Western Europe, subsequent to their submergence in the glacial sea and the deposition of the boulder clay, stood much higher than at the present time, is a matter capable of direct proof. The extent of the elevation was such at one time as to admit of the British Isles being an integral part of the Continent; without which it would be impossible for the fauna of the river-gravels and the bone caves to have spread over the greater part of the British Isles. Moreover, most of these animals found access to several districts which are now islands. In the recently discovered Palæolithic cave in Jersey were found some human teeth, together with bones of the reindeer, woolly rhinoceros, horse, some species of deer and bovidæ, associated with flint implements of Moustérien types—a combination of relics which conclusively proves that Jersey was formerly connected with the Continent. (*Archæologia*, vol. lxxii., p. 454.)

Professor Boyd Dawkins, in describing ossiferous caverns in Pembrokeshire, thus writes :—

“The discovery of mammoth and rhinoceros, horse, Irish elk, bison, wolf, lion, and bear, on so small an island as Caldy, indicates that a considerable change has taken place in relation of the land to the sea in that district since these animals were alive. It would have been impossible for so many and so large animals to have obtained food on so small an island. It may therefore be reasonably concluded that when they perished in the fissures, Caldy was not an island, but a precipitous hill, overlooking the broad valley now covered by the waters of the Bristol Channel, but then affording abundant pasture. The same inference may also be drawn from the vast numbers of animals found in the Gower caves, which could not have been supported by the scant herbage of the limestone hills of that district. We must, therefore, picture to ourselves a fertile plain occupying the whole of the Bristol Channel, and supporting herds of reindeer, horses, and bison, many elephants and rhinoceroses, and now and then being traversed by a stray hippopotamus, which would afford abundant prey to the lions, bears, and hyænas inhabiting all the accessible caves, as well as to their great enemy and destroyer, man.” (*Cave Hunting*, p. 289.)

I have already referred to bones and teeth of extinct mammalia as having been dredged from the bed of the German Ocean; and also to submerged forests. On the latter point,

Mr Pengelly, while describing the well-known submerged forest in Torbay, makes the following remarks:—

“Similar and coeval forests are well known to exist on the opposite shores of all the British seas and channels. They everywhere present the same phenomena, among which may be specially mentioned large vertical stumps of trees, having roots and rootlets ramifying to considerable distances through the clay. They have been described by a large number of observers, and it may be safely concluded that they are the remains of forests *in situ*, carried to their present level by a general, uniform, and tranquil subsidence of the British Archipelago, and of, at least, Western Europe. Everywhere the change of level appears to be the same, the stumps *in situ* are always vertical, and the roots have the same relation to the horizontal plain as they must have had when growing. Mixed with the vegetable remains, which are those of such species of plants and trees as still exist in the neighbourhood, there have been found the bones of the mammoth, *Bos longifrons*, red-deer, horse, and wild-hog. In the Torbay forest a human implement, made of the antler of the red-deer, was found 12 feet below the surface.” (*Transactions of the Devonshire Association*, etc., 1867.)

Hoxne Brick-earth.

Perhaps the most conclusive evidence of the relation of the works of Palæolithic Man to the glacial period is that of the committee appointed by the British Association, in 1895, to ascertain the relation between the implement-bearing brick-earth at Hoxne and the neighbouring boulder clay. The investigations were carried out by sinking pits and borings across the ancient silted-up channel of what was a small tributary stream, now represented by the brick-earth deposits at Hoxne, of which descriptive plans and sections are given in the committee's report for 1896 (*Liverpool Meeting*, p. 400). The following precise statement, quoted from the committee's concluding remarks, will suffice for our present purpose:—

“It is true that the evidence is now perfectly clear that the well-known Palæolithic implements of Hoxne are much later than the Boulder Clay of that district. . . . It is possible that in other districts man may be interglacial or pre-glacial, but on this question the Hoxne excavations throw no light: they only show that a race of men using implements of the Hoxne type certainly inhabited Suffolk long after the latest glaciation of that district. Whether precisely the same form of implement is likely to have been in use in Britain in both pre-glacial and post-glacial times is a question into which we need not enter.”

General Remarks.

In Lyell's *Antiquity of Man*, p. 279, and in the works of several subsequent writers, are published maps showing the extent of sea which would become land by a general rise of 600 feet. Such elevations are supposed on good grounds to have occurred on two occasions. First, when the Cromer Forest bed flourished; and secondly, during the interglacial period which followed the formation of the boulder clay. It was during the latter that man and his contemporary mammalia roamed over Western Europe, and left their traces in the river-drift gravels and bone-caves of England.

Theories on the chronological phase of the subject are, however, so divergent and even contradictory, that the only thing one can do is to add to their number by advocating the opinion which commends itself to his judgment after carefully considering the leading facts of the problems at issue.

G. de Mortillet thus expresses his opinion of man's relation to the glacial epoch:—

“Les partisans de la pluralité des périodes glaciaires font généralement apparaître l'homme pendant une période interglaciaire. C'est une erreur. En effet, la glaciation, bien qu'ayant parfois pris de vastes proportions, a toujours été, même dans son plus grand développement, un phénomène local et circonscrit. Il existe des régions, et la plus grande partie de la France est dans ce cas, qui n'ont jamais connu les glaciers. Pendant que le territoire recouvert par les glaciers voyait se produire et se développer toutes les actions glaciaires, le territoire libre de glace se remplissait d'alluvions. Or les alluvions les plus anciennes ont, en France, fourni des coups-de-poing Chelléens.” (*Formation de la Nation Française*, p. 233.)

Again he says—“Le développement continu de cette industrie a permis de diviser les temps quaternaires anciens en quatre grandes époques: la première, le Chelléen antérieure à la période glaciaire; la seconde, le Moustérien, contemporaine de cette période; les troisième et quatrième, le Solutréen et le Magdalénien postérieures.” (*Le Préhistorique*, 3rd ed., p. 665.)

M. Boule describes the contents of the Grotte du Prince (No. 7 of the Grottes de Grimaldi) as containing two distinct faunas—one, the lowest, being represented by *Elephas antiquus*, *Rhinoceros merckii*, and especially the *Hippopotamus*; the second he distinguishes “par la disparition progressive des éléments chauds et par l'apparition ou développement d'espèces froides.” He then observes that “the superposition of these

two faunas, the lower denoting a warm climate, and the upper a cold climate, has been observed in several instances in Central and Western Europe." His concluding remarks are :—

"Les géologues enclins à multiplier les périodes glaciaires et désireux de trouver dans les données paléontologiques des arguments en faveur de leurs conceptions d'ordre purement physique, penseront peut-être que la faune chaude des foyers inférieurs de la Grotte du Prince n'est pas contemporaine de celle de Chelles mais qu'elle correspond à un retour de cette faune pendant une époque interglaciaire plus récente. Je ferai remarquer, dans ce cas, qu'aucun fait ne vient à l'appui d'une telle hypothèse ; qu'une pareille alternance n'a jamais été constatée dans des couches en superposition." (*Congrès International*, 1906, p. 70.)

The different opinions thus disclosed involve an irreconcilable problem in the development of human culture. If the Chelléen implements are pre-glacial, while their facsimiles in England are post-glacial in the sense of being posterior to the boulder clay, it would follow that the coup-de-poing was a stereotyped implement of humanity during the larger portion of the glacial epoch. Had flint implements similar to those of the river gravels been found in the Cromer Forest bed, we might accept the Chelléen flint industry as pre-glacial ; but as matters stand I hold that the river deposits, both at Chelles and at the different stations of the Somme Valley, belong to the middle Pleistocene period, and are to be paralleled with those of the drift-gravels of the Thames and its collateral valleys in the south of England. To understand M. Boule's position in this matter it must be borne in mind that, according to his system of classification, the station of Chelles is placed in the middle Quaternary epoch, posterior to two and anterior to one glacial extension.

The discoveries of Mr Worthington G. Smith (*Man, the Primeval Savage*) of inhabited sites during the Palæolithic period, at Caddington, Stoke Newington, etc., go far to support this view. All the "floors" were not only within the interglacial period, but the manufactured implements show progressive stages in workmanship from the coup-de-poing down to late Moustérien types. Similar evidence is supplied by another Palæolithic floor, explored by Mr F. C. J. Spurrell at Crayford, which has the exceptional feature of showing the actual flakes that were struck off in trimming flint nodules into shape. In

one instance the implement was accidentally broken before it was finished, and Mr Spurrell recovered the two portions, as well as the discarded flakes, and with remarkable ingenuity he has replaced the whole into their original position. These interesting relics are exhibited in the Natural History Museum. This remarkable workshop was formed in deposits of brick-earth and sand, at a height of 70 feet about sea-level, and a depth of 36 feet from the present surface. (*Quart. Journ. Geo. Soc.*, vol. xxxvi., p. 544.)

CHAPTER V

FOSSIL MAN (EARLY RECORDS)

Fossil Man defined. Missing Links. Early Records. Cave of Bise. Schmerling's Researches. Lahr Skeleton. Fossil Man of Denise. Arcy-sur-Cure Jaw. Neanderthal Skull. Lyell's *Antiquity of Man*. Origin of Species. Virchow on Canstadt and Neanderthal Skulls. Smeermass Jaw. Moulin-Quignon Jaw.

OF the successive generations which have peopled the globe since man first appeared on the scene we know very little, owing to the inexorable law of nature which destines the human body soon after death to revert to its original dust. How, then, it may be asked, does fossil man occur in nature? In answer to this pertinent query I may at once explain, that fossil man is the product of exceptional circumstances, partly due to the vicarious action of natural agencies, and partly to operations initiated by man himself. Thus, if the body of an animal, such as that of man or of a mammoth, be accidentally deposited in the mud of a lake, sea, or river, or entombed in débris of fallen roof of a cave, or sunk in a bog of growing peat, or frozen in a field of perpetual ice, the law of decomposition is apt to be retarded indefinitely. Hence in certain but rare circumstances the body of an animal may be preserved for many centuries after its congeners have crumbled into dust. In Arctic regions the carcasses of mammoths have been frequently discovered embedded in the frozen soil of the tundras of Northern Siberia, having their flesh so thoroughly preserved that it is known to have been eaten by the dogs of the present day. (For references, see *Mammals, Living and Extinct*, by Flower and Lydekker, p. 431.) Nor is it a rare occurrence to find the bodies of animals, and even those of

human beings, which had accidentally perished in mossy bogs centuries ago, completely mummified by the preservative qualities of the matrix in which they were so long embedded. Then, again, man in the course of his progressive civilisation became a religious being, and purposely buried his dead in a cave or in a constructed chamber, so as to preserve the body; and as a further development of the same idea, he occasionally resorted to the process of embalming and *scarnitura*. The result of such fortuitous circumstances, though not intended for the instruction of the prehistorian, has not infrequently supplied him with valuable materials in the shape of the osseous remains of specimens of past humanity more or less fossilised.¹

Missing Links.

On the supposition that man is a descendant of one of the higher vertebrates by a process of natural development, it necessarily follows that he must have passed through a series of physical changes, in the form of intermediary links, which connected him with the generic stock. Hence, one of the preliminary problems which anthropologists have to consider is, to ascertain if these connecting links have left any traces behind them which can throw light on the remarkable transformation man has undergone in his passage from brute to civilised life. It is for this reason that fossil remains of man are so important in the study of anthropology. But scarcely had a start been made in this kind of research when the evidence became partly discredited by the eagerness of its own votaries in admitting, as legitimate data, materials of a more or less doubtful character. In this category must be placed the so-called Eolithic implements hitherto advanced as evidence of the existence of Tertiary man. These objects are found in various places in the south of England, notably on the Kent plateau, and in the Tertiary deposits of Thenay (Loir-et-Cher) and Puy-Courny (Cantal), in France. That some of these "eoliths" may have been the rude beginnings of man's first

¹ The expression "fossil man" may be applied to any portions of the human body found in geological strata, but as it is only bone that continues undecayed for any length of time, it practically means the skeleton in a more or less fragmentary condition.

efforts as a tool-maker, I am not prepared to deny, more especially as we have no other class of worked objects recognised as the product of his hands to fill the gap which evidently exists between them and the well-formed implements of the drift-gravels of Europe. The coup-de-poing is clearly "something more than the first efforts of an unpractised hand." It was, indeed, the result of long experience at a time when progress in mechanical skill was necessarily slow; and hence for ages it remained the finished tool of the then civilised world. The crux of the Eolithic problem lies in the difficulty of deciding between natural products and the works of man. No doubt sticks and stones, without any manipulation, were used as weapons before mechanical skill came into requisition.

The only fact bearing on the probable origin of man in the Tertiary period which strikes me as worth mentioning, in the present state of knowledge on the subject, is that the simian races of to-day appear to have made no advance in cranial development on those of the Pliocene period. This has been shown by the facial and cranial characters of *Mesopithecus pentelici* found at Pikermi, at the foot of Mount Pentelicus, in Greece. The lower jaw of *Dryopithecus fontani*, according to M. Albert Gaudry (*Les Enchainements du Monde animal dans les temps géologiques*, p. 236), also approaches nearer to that of man than the jaws of the present anthropoid apes. This is what might be expected, as between man and the higher apes there is no room for the existence of an intermediate animal. Such a being must have competed for his life either on brute principles or on those evolved by human ingenuity. Since man discovered, and rapidly utilised, the principles of intelligence and mechanical appliances, there was only one platform for the successful struggle of life. During that period not only had apes remained stationary, or perhaps retrograded, but many of the less progressive human races which sprung into being had also fallen into the background and died out. The law of the survival of the fittest applies to all living organisms, and dominates life in all ages, more especially in the field of existence selected by *Homo sapiens*, where advancement depends on mechanical skill and intelligence.

Early Records.

Prior to the publication of Lyell's *Antiquity of Man* (6th February 1863), a few discoveries of human bones associated with those of extinct mammalia had been recorded, but for various reasons they failed to attract much attention from the anthropologists of the day. Subsequent to that date such discoveries were more frequent, but they are so widely scattered that it would be confusing to describe them in chronological order. It will, therefore, be more convenient to treat the former in the order of their discovery, and the latter in groups according to their geographical distribution.

The Cave of Bise.

In 1828 M. Tournal, keeper of the Museum of Narbonne, described the finding of human bones and teeth, objects of flint and bone, together with fragments of rude pottery, in the Cave of Bise (Aude), associated with bones of rhinoceros, hyæna, bear, reindeer, etc. These relics were embedded in clayey mud cemented by stalagmite, and M. Tournal distinctly declared that they had not been washed into the cave by any "diluvial catastrophe." The cave was subsequently explored by MM. Marcel de Serres, Brinckmann, Julien, and Cazalis de Fondouce, who also disinterred from it flint and bone objects, some of the latter showing traces of engravings of Magdalénien types. According to Marcel de Serres, the human bones were exactly in the same chemical condition as those of the extinct mammalia. In the upper layer fragments of pottery of Neolithic forms were found, and hence M. Desnoyers disputed the great antiquity assigned by the discoverers to the human remains. About the same time M. Chrystal of Montpellier discovered in the environs of Pondres (Gard), human bones in a clay deposit, which contained bones of the hyæna and rhinoceros, and of which an account was published in 1829, under the title, *Notice sur les ossements humains des cavernes du Gard*.¹

¹ For reference to the literature on these discoveries, see Hamy's *Paléontologie Humaine*, p. 289; and Lyell's *Antiquity of Man*, p. 59.

Schmerling's Researches.

In 1829 Dr Schmerling commenced his memorable researches in the numerous caverns that border on the valleys of the Meuse and its tributaries, in the province of Liège, and gave descriptive accounts of the contents of more than forty of them. The evidence of man's antiquity revealed by his investigations, consisted of flint implements and the remains of several human skeletons, associated with the bones of hyæna, lion, rhinoceros, mammoth, bear, and reindeer. In the Engis cavern he disinterred the remains of at least three human skeletons. The skull of one of them, that of a young person,



FIG. 17.—Engis Skull, side view.

lay by the side of a mammoth tooth, but it fell to pieces in the course of being extracted. Another skull "was buried 5 feet deep in breccia, in which the tooth of a rhinoceros, several bones of a horse, and some of the reindeer together with some ruminants occurred." This was the only skull preserved by Schmerling which was in a "sufficient state of integrity to enable the anatomist to speculate on the race to which it belonged" (Figs. 17 and 18)—a process to which it was subsequently subjected by Professor Huxley, many years after its discovery, in his celebrated work, *Man's Place in Nature*, chap. 3.

As its anatomical characteristics are not very different from those of a modern European skull, it is unnecessary to dwell on this phase of the subject. After observing that assuredly

there was no mark of degradation about any part of its structure, Huxley concludes his description of it with the following words:—"It is in fact a fair average human skull, which might have belonged to a philosopher or might have contained the thoughtless brains of a savage."

Considering all the circumstances, it appears to me that an exaggerated importance has been given to the Engis skull on account of its supposed great antiquity, which, it was thought, had been established beyond doubt by the presence in the same matrix of bones of the extinct animals, forgetting, as G. de Mortillet had suggested, that the six or seven skeletons found in these caverns might have been Neolithic interments.

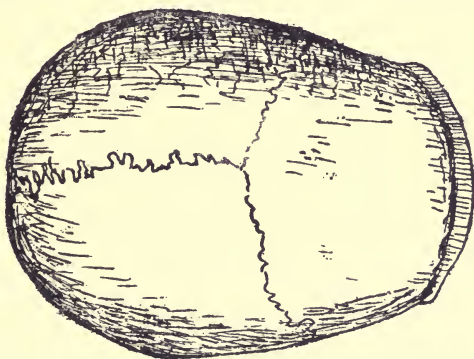


FIG. 18.—Engis Skull, top view. (After Huxley.)

Dr Schmerling published an account of his discoveries in two splendid volumes, with an atlas of seventy-four plates (1833-4), in which, in the most unequivocal language, he contended for the contemporaneity of man with these extinct animals; but owing chiefly to the influence of the great naturalist, Cuvier, his opinions and arguments did not receive the attention they merited. Remains of man found in caverns were thus summarily disposed of by Cuvier:—"On a fait grand bruit, il y a quelques mois de certains fragments humains trouvés dans des cavernes à ossements de nos provinces méridionales, mais il suffit qu'ils aient été trouvés dans les cavernes pour qu'ils rentrent dans la règle." (*Discours sur les Révolutions du Globe*, p. 89.)

Schmerling regarded the débris of man and animals as lying in a haphazard manner, under the belief that they had

been washed into the caverns by floods—an idea which unfortunately prevented him from taking due notice of the relative position of the associated objects.

Like most other scientists of the day, Sir Charles Lyell, who visited Schmerling in 1833, was then sceptical about the value of the latter's discoveries; but it is interesting to note that in his *Antiquity of Man* (pp. 67-9) he makes a long apology to the Belgian investigator for not giving the weight to his opinions which he then considered they were entitled to. The apology concludes as follows:—"When these circumstances are taken into account, we need scarcely wonder, not only that a passing traveller failed to stop and scrutinise the evidence, but that a quarter of a century should have elapsed before even the neighbouring professors of the university of Liège came forth to vindicate the truthfulness of their indefatigable and clear-sighted countryman."

The Lahr Skeleton.

In 1823 M. Ami Boué, an experienced geologist, extracted with his own hands portions of a human skeleton from an undisturbed loess at Lahr, on the right bank of the Rhine Valley, and nearly opposite to Strasburg. Boué attributed great antiquity to these bones, partly because they were so low down in the loess, and partly because in loess of the same age remains of extinct mammalia had been detected. Sir Charles Lyell, when writing his *Antiquity of Man*, became interested in M. Boué's discovery, and corresponded with him as to the precise facts of the case, which he thus describes:—

"In this part of that plain the loess is at least 200 feet thick, and small hills and valleys have been excavated in it. A portion of the formation passes up from the principal into the tributary valley, the sides of which it skirts, rising to the height of 80 feet or more above the Schutter. It has been denuded at Lahr, so as to form a succession of terraces on the right bank of the small stream. On examining the lowest of these terraces, M. Boué saw, in the face of a perpendicular cliff of loess, about 5 feet high, a large bone projecting, which proved afterwards to be a human femur. On digging into the cliff the bones of nearly half a skeleton were obtained, consisting of the femur, tibia, fibula, ribs, vertebra, metatarsals, and others; but no skull. They lay in a nearly horizontal position, but not as if they were part of a corpse which had been buried there." (*Ibid.*, p. 533, K.)

Notwithstanding Lyell's positive statement that there was no skull among the Lahr bones (which is probably correct)—an opinion which M. Hamy confirms (*C.A.P.*, 1889, p. 424)—M. Pruner Bey intimated in the course of discussion at the International Congress of Prehistoric Archæology, held in Paris 1867 (*Comptes rendus*, p. 358), that he had seen the box of bones left by Boué with Cuvier, and that it contained a skull, which he thus describes :—"D'ailleurs, j'ai vu ces ossements et j'ai contemplé avec une attention particulière le crâne. C'est une crâne dolichocéphale et féminin, très-semblable à celui-ci qui provient de Vauréal, et à cet égard le grand homme avait raison ; c'est, en effet un crâne comme on en rencontre journellement."

On the other hand, Paul Broca, at the same meeting (p. 390), after severely reflecting on Cuvier's treatment of the Lahr bones, thus states his own opinion :—"L'analyse des circonstances qui précèdent nous permet donc aujourd'hui d'accorder une grande confiance à la découverte de M. Ami Boué, et d'ajouter le crâne de Lahr à la liste des crânes dolichocéphales paléontologiques."

But this discrepancy matters little, the important point is that Sir Charles believed in Boué's interpretation of the facts. "Having now," he writes, "read the original memoirs of M. Boué, and corresponded with him on the subject, I have no hesitation in declaring my opinion that the conclusions at which he arrived are fully borne out by the facts." (*Loc. cit.*, p. 532.)

Fossil Man of Denise.

On the 24th of November 1844, M. Aymard, the secretary of the Société Académique of Le Puy, published (*Bul. de la Société Geo. de France*) a notice of the discovery of human remains in a bed of lava or volcanic breccia in the Commune d'Espaly (Haute-Loire). The natural inference was that this fossil man was contemporary with the last volcanic eruption of the Velay. But various objections were raised against this interpretation of the facts, some saying that the man had fallen into a crevice, others that it was a forgery, etc. Among the human bones from this locality preserved in the Museum of Le Puy was a portion of the frontal bone, which is thus described by M. Sauvage (*Rev. d'Anthropologie*, 1872, p. 294) :—"La portion

de ce frontal que l'on peut étudier, nous montre les arcades sourcilières saillantes en bourrelet épais, une glabellle proéminente surmontée d'un front fuyant, qu'en sépare une partie fortement déprimée."

Lyell informs us that, at a meeting of the Scientific Congress of France, held at Le Puy in 1856, the question of the age of the Denise fossil bones was fully discussed, and the conclusion come to was that they "had been enveloped by natural causes in the tufaceous matrix in which we now see them." (*Loc. cit.*, p. 195.)

Arcy-sur-Cure Jaw.

In the Grotte des Fées at Arcy-sur-Cure (Yonne), during the year 1859, the Marquis de Vibraye found portion of a human mandible which presented anatomical characters intermediary between those of the "Naulette mâchoire" and modern jaws. The circumstances were as follows:—

The contents of the cave were divided into three formations. The first, or uppermost, belonged to the Neolithic period, and contained several polished stone axes and fragments of Gallo-Roman pottery. The second consisted of red alluvium, in which were embedded flint knives, scrapers, borers, and objects made of bone, together with many broken bones of reindeer and horse—all of which disclosed Magdalénien culture. The third, or lowest formation, was composed of granitic materials like the "diluvium gris" of Paris. In it were numerous bones of the mammoth, woolly-haired rhinoceros, cave-bear, cave-hyæna, reindeer, and numerous species of bovidæ. It was on the surface of this deposit that the human jaw and a tooth belonging to a different individual were found. De Vibraye states that the jaw was placed between a complete skull of a cave-bear and fragments of the jaw of a hyæna. In Broca's diagram of the development of the chin (Fig. 4), the Arcy jaw is figured as No. 4, showing a greater approach to the perpendicular line than the Naulette jaw.

Neanderthal Skull.

In 1857 Professor Schaaffhausen and Dr Fuhlrott published an account of a skeleton found in the cave of Feldhofen, situated at the entrance to a small ravine called Neanderthal, on the

right bank of the river Düssel. The opening to the cave was from a small terrace in a steep limestone cliff, about 60 feet above the bed of the river and 110 feet below the surface of the plateau above. The cave has long ago been quarried away, but its dimensions are reported to have been about 16 feet in length, 11 feet in breadth, and 8 feet in height. Lyell gives a section showing a natural rent connecting the cave with the surface of the plateau above. The very existence of this rent, at any time, is categorically denied by M. G. de Mortillet. "Dans un dessin," says he, "qui court tous les ouvrages de paléoethnologie, Lyell représente un couloir qui partant du fond de la grotte remonte en s'arquant jusqu'à la surface du plateau. C'est une pure conception théorique. Ce couloir n'a jamais été constaté." (*Le Préhistorique*, p. 232.)

On the uneven floor of the cave lay a mass of consolidated mud about 5 feet in depth, without stalagmitic deposits, but sparingly mixed with rounded fragments of chert.

"In the removing of this deposit" (writes Dr Fuhlrott, as translated by Mr Busk) "the bones were discovered. The skull was first noticed, placed nearest to the entrance of the cavern; and further in, the other bones, lying in the same horizontal plane. Of this I was assured in the most positive terms by two labourers who were employed to clear out the grotto, and who were questioned by me on the spot. At first no idea was entertained of the bones being human; and it was not till several weeks after their discovery that they were recognised as such by me and placed in security. But, as the importance of the discovery was not at the time perceived, the labourers were very careless in the collecting, and secured chiefly only the larger bones; and to this circumstance it may be attributed that fragments merely of the probably perfect skeleton came into my possession." (Huxley's *Collected Essays*, vii., p. 170.)

The discovery was made in August 1856, and Dr Fuhlrott arrived on the scene only in time to save and secure the skull-cap, the two thigh- and arm-bones, portions of the forearms, a fragment of the right shoulder-blade, the left ilium, and five fragments of ribs.

No other animal remains, with the exception of a bear's tooth, of which neither the position nor character was determined, were discovered in the cave. Professor Schaaffhausen describes the cranium as covered, both on its outer and inner surface, with a profusion of minute dendritical crystallisations; from which, however, no chronological inference can be drawn,

as, according to von Meyer, such deposits are no proof of vast antiquity—he himself being in possession of a dog's skull from a neighbouring Roman camp with similar marks. It may also be mentioned that the country above the Neanderthal is over-spread with loess or *lehm*, identical with that in the Feldhofen Cave; and that some years later (1865) another cave was discovered, only one hundred and thirty paces distant from the former, and on the same side of the ravine, which contained not only mud of the same kind, but also bones of the rhinoceros, cave-bear, and hyæna. Some of these bones, especially those of the cave-bear, are, according to Schaaffhausen, very similar in colour, density, microscopical structure, and state of preservation to those of the Neanderthal skeleton; and the suggestion is that the animal and human remains from both caves were contemporary. (*Journal de Cologne*, 1st April 1866; quoted by Mortillet in *Le Préhistorique*, p. 233.)

The human remains from Neanderthal, especially the skull, presented such remarkable peculiarities that, when first exhibited at a scientific meeting at Bonn, doubts were expressed by several naturalists as to whether they were really human. The limb-bones were characterised by great thickness, with unusual development of the elevations and depressions for the attachment of muscles, and the ribs had a singularly rounded shape and abrupt curvature—all characters indicating great muscular power. The left humerus was more slender than the right—a fact which suggested the idea that the two did not belong to the same individual; but this was shown to have been the result of an injury during lifetime. The cranium (Figs. 8, 9) was of great size and thickness, and had a long elliptical form, a low retreating forehead, excessive development of the frontal sinuses, and a great projection of the occipital region. The sutures were nearly obliterated, and the line of the frontal suture was marked by a slight ridge. The dimensions of the skull were as follows:—

| | | | | | |
|--------------------------|---|---|---|-----------------|------------|
| Antero-posterior | . | . | . | diameter (max.) | MM. 200 |
| Transverse | . | . | . | " | 144 |
| Frontal | . | . | . | " (min.) | 106 |
| " | . | . | . | (max.) | 122 |
| Horizontal circumference | . | . | . | (571?) | 590 |
| Cephalic index | . | . | . | | 72 |

Schaaffhausen estimated its capacity at 1033.4 c.c. (63 cubic inches), but Huxley makes it 1330 c.c. (75 cubic inches).

Huxley, writing in 1863, thus expresses his opinion of the Neanderthal skull :—

“There can be no doubt that, as Professor Schaaffhausen and Mr Busk have stated, this skull is the most brutal of all known human skulls, resembling those of the apes not only in the prodigious development of the superciliary prominences, and the forward extension of the orbits, but still more in the depressed form of the brain-case, in the straightness of the squamosal suture, and in the complete retreat of the occiput forward and upward, from the superior occipital ridges.” (*Antiquity of Man*, p. 84.)

Lyell's “Antiquity of Man.”

With the appearance of *The Geological Evidences of the Antiquity of Man*, anthropology may be said to have suddenly sprung into existence fully armed and fledged, like Minerva from the brain of Jupiter. In this celebrated work the author collected the previously recorded materials bearing on the early history of man from all parts of the world. The effect of its accumulated details was so overwhelming that there could no longer be any doubt that the existence of humanity on the globe must be relegated far back into the Quaternary period. Many circumstances contributed to this remarkable revolution in current philosophical beliefs. We have already noted the sensational result of the sudden admission by the foremost archæologists of the day, that the quaint flint objects discovered by Boucher de Perthes were the genuine implements of an old-world people whose very existence had previously been either unknown or ignored. Moreover, the entire borderland of geology and anthropology was being better understood, especially as regards the glacial phenomena of Northern and Western Europe; and archæology proper, independently of its new-born Palæolithic phase, had acquired a wider significance, owing to the more rigid and scientific methods adopted in its study. The successive discoveries of the Danish Kōkkenmōddings and the Swiss lake-dwellings, with the vast and varied wealth of prehistoric materials which they brought to light, now also began to attract attention.

Origin of Species.

While these problems and their numerous side issues were being discussed, the scientific world was startled by the publication of Charles Darwin's *Origin of Species* (1859). In this work the author advocated with singular completeness and ability, that the various species of plants and animals now extant and being continued by the ordinary law of generation, had been derived from pre-existing forms by secondary causes — a process which he designated under the name of Natural Selection. In this manner Mr Darwin traced the origin of man through a series of intermediate forms back to protoplasm, without the intervention of repeated cataclysms and special creative dramas, as was generally held by the earlier geologists. "As all the living forms of life," he writes, "are the lineal descendants of those which lived long before the Cambrian epoch, we may feel certain that the ordinary succession by generation has never once been broken, and that no cataclysm has desolated the whole world." (*Origin of Species*, p. 428.)

Like all the profound secrets of Nature, the grandeur of Mr Darwin's conception lay in the simplicity and transparency of its truth; and as a small particle leavens the mass, so the words "struggle for existence" and "survival of the fittest" set the whole philosophical world into a ferment. Indeed, it is impossible to exaggerate the profound effect produced on his fellow-men by the doctrine thus taught by Mr Darwin. Many of the greatest naturalists of the day at once discarded their former creeds, and adopted the evolution theory of life; and at the present time it may well be asked who and where are its opponents!

Of all the thinking men who adopted the evolution theory of man's origin, Huxley takes the foremost place.

By the publication of his three famous lectures on Man's Place in Nature (1863), he finally shattered the hypothesis which assigned man's origin and civilisation to a *sui generis* code outside the ordinary laws of the organic world. These are a few of the scientific facts and speculations which loomed on the philosophical horizon when the theory of man's natural

development and great antiquity was first promulgated, together with some illustrations of the nature and sources of the evidence on which the novel doctrine was founded. The avidity with which it was received is shown by the fact that, within a year of the publication of the *Antiquity of Man*, no less than three editions were called for. This success was no doubt partly due to the marvellous ability of the author in generalising and popularising his facts, but to a large degree it was the result of the extreme tension on the philosophic mind which, by this time, had become so much unhinged as to be on the *qui vive* for some such *exposé*. The result was a complete victory for scientific truth and its methods of research. Henceforth a new impetus was given to the study of the science of anthropology by the conviction that the meanest traces of man's early career were actually more important materials for a history of humanity than all the treasures that had been collected from the ruins of the greatest empires of the historic world. The wide morphological gap between man and the other animals still living suggested a correspondingly long period for man's development, in the course of which it was expected that some evidence of the stages through which he had passed might have become stereotyped in the geological records. Where to find and how to interpret such materials were now the chief problems at issue; and to their solution the savants of all countries braced themselves with an energy that augured final success. Societies were founded in London, Paris, and other centres of intellectuality, for the express purpose of following up the new-found trail of humanity; and to popularise and disseminate their doctrines numerous periodicals and special works were published. One periodical may be specially mentioned, viz., *Les Matériaux pour l'histoire primitive et naturelle de l'homme*—which, since it was started by G. de Mortillet, had been the means of giving wide publicity to the new doctrines. In the year 1865, at a special meeting of the Italian Society of Natural Science held at Spezzia, was founded the "Congrès International d'Anthropologie et d'Archéologie préhistoriques," the first meeting of which was held in the following year at Neuchâtel. Subsequent meetings have been held at Paris (1867), London (Norwich, 1868),

Copenhagen (1869), Bologna (1871), Brussels (1872), Stockholm (1874), Buda-Pesth (1876), Lisbon (1880), Paris (1889), Moscow (1892), Paris (1900), Monaco (1906), and Geneva (1912). The published proceedings of these Congresses contain the most complete records of the progress of the science, especially as regards Europe. After the cloud of scepticism which enveloped its early and evolutionary stages had been swept aside, anthropology found a footing at the British Association, at first as a sectional department, but since 1884 it became expedient to devote a special section for the exclusive consideration of its doctrines. At the same time it cannot be denied that the negative side of the evolution problem, which had so long found a refuge among religious bodies under the false assumption that their views had the imprimatur of the Biblical narrative of creation, had still its advocates—for it seems that no amount of evidence can eradicate the rooted objections of some persons to the doctrine of evolution. As a comment on the disputations of earlier years, on the supposed simian characters of the Neanderthal and Canstadt skulls, I may quote the following remarks by the late Professor Virchow at a meeting of the C.A.P. held at Moscow in 1892:—

Virchow on "Neanderthal and Canstadt Skulls."

"Les objets de la paléo-anthropologie sont si rares et pour la plupart si douteux que jusqu'ici la tentative de la description de la race la plus ancienne de l'homme quaternaire dépasse les force de la science. En Europe, nous avons eu deux exemples bien décourageants: ceux du crâne de Canstadt et du crâne de Néanderthal, qui ont été regardés par des savants éminents comme ayant appartenu aux ancêtres directs de la race Européenne primitive. Il y a quinze jours, au Congrès des anthropologues allemands à Ulm, nous avons discuté la question soulevée à propos de ces deux pièces, et nous avons trouvé que le crâne de Canstadt n'appartient pas à l'époque quaternaire et que le crâne de Néanderthal est pour le moins très loin d'avoir une forme typique." (*C.A.P.*, 1892, vol. ii, p. 224.)

The difficulty of discovering and correctly interpreting the phenomena of fossil man is a poor apology for the readiness with which anthropologists admit into their speculations so many objects of doubtful authenticity. It seems to me that it was in defiance of all scientific methods and rules of correct

reasoning that the Canstadt skull had ever been adopted as a racial type, although the probability of its being a genuine Palæolithic fossil is now stronger than formerly. The facts of its discovery are as follows :—

In the year 1700, the then Duke of Wurtemberg excavated a Roman oppidum in the neighbourhood of Stuttgart, in the course of which a large quantity of bones, including those of Quaternary animals, were dug up and preserved in the duke's museum. A hundred years later a human jaw was found among these bones, and on this discovery being brought under the notice of Cuvier, he declined to regard it as of any value owing to the entire absence of information as to its position in the earth.

In 1855 Mr Jaeger found in the same collection a portion of a human cranial vault, and brought this fact forward as an argument in favour of the coexistence of man with the extinct mammals.

Smeermass Jaw.

Sir Charles Lyell accepted many of the speculations founded on this kind of evidence. Nor is it alone on such grounds that his accuracy has been called in question. A human jaw found by Professor Crahay, near Maestricht, and known as the "Smeermass machoire," was described by Lyell as coeval with a mammoth tusk disinterred "six yards removed from the human jaw in horizontal distance." Now, however, it is proved that the tusk was 24 feet deeper than the skull, and that the latter was merely a relic from a crannog of the Neolithic age, since discovered and investigated. An epitome of the evidence on which this prosaic conclusion has been arrived at will be found in my work on the *Lake-dwellings of Europe*, pp. 305-6.

Moulin-Quignon Jaw.

The difficulty of coming to a decision about discoveries of this kind is sometimes very embarrassing. Thus, in the case of the notorious Moulin-Quignon jaw, the "controversy reached such a climax that the disputants arranged to hold an international congress of representative men to inquire into the whole circumstances. Accordingly, this congress was opened in Paris on 9th May 1863. France was represented by MM. Lartet,

Delesse, De Quatrefages, Bourgeois, Bateux, Gaudry, Desnoyers, and Milne-Edwards: England by MM. Falconer, Prestwich, Carpenter and Busk (Evans had also been nominated but was unable to attend). M. Milne-Edwards presided, and in the name of his French colleagues presented a report affirming the authenticity of the jaw; but after many meetings, much discussion, and a visit to Abbeville, the English representatives remained unconvinced, and so the congress dispersed, leaving the jaw as much as ever a "bone of contention." (*Archæology and False Antiquities*, p. 32.)

Moulin-Quignon chin is prominent; that of Malarnaud slants backwards.



Ascending ramus of the former is also different from the short and more upright one of the latter.



FIG. 19.—Outlines of Moulin-Quignon (upper) and Malarnaud Human Mandibles.
(After Quatrefages and Hamy.)

The outline of this mandible is given on Fig. 19, and for comparison that of Malarnaud, which undoubtedly belonged to an individual of the Neanderthal-Spy race, is placed beside it.

CHAPTER VI

FOSSIL MAN (BRITAIN AND BELGIUM)

1. DISCOVERIES IN BRITAIN.—Man contemporary with Irish Elk in Ireland. Skeleton of Tilbury. Skull at Bury St Edmunds. Galley Hill Skeleton.
2. DISCOVERIES IN BELGIUM.—Trou de la Naulette. Trou du Frontal. Cavern of Goyet, Trou Magrite, etc. Les Hommes de Spy.

I. DISCOVERIES IN BRITAIN.

ALTHOUGH some of the Pleistocene fauna (including the mammoth, reindeer, and Irish elk) found their way as far west as Ireland, no evidence of the presence of Palæolithic man in that island has yet been discovered—a fact which may possibly be due to want of adequate exploration. But in present circumstances it suggests that the westward movement of the continental fauna had been intercepted by alterations in the level of sea and land. The Irish Channel being 38 fathoms deep, while that between England and the Continent is only 20 fathoms, it would follow that the former would become sea during a process of gradual submergence long before the latter. When the British Isles stood at their maximum elevation continental mammalia could roam as far as the Atlantic without any water impediment, but as the gradual subsidence progressed the Irish Channel would be first blocked against them; so that for a considerable interval of time animals could still come to Britain but not to Ireland. From researches carried on some time ago in the cave of Ballynamintra, Co. Waterford, it has been shown that the Irish elk was contemporary with Neolithic man in that neighbourhood. The cave is one of a series in the limestone tract which stretches from the Blackwater River to Dungarvan Bay. The entrance is about 12 feet above the flat ground in front, and extends for 30 feet as a horizontal tunnel 10 feet wide, after which it widens and the

roof rises in an irregular manner. The contents were stratified, and among them were bones of man, horse, pig, ox, goat, red deer, Irish elk, grizzly bear, badger, wolf, fox, dog, marten, hare, rabbit, and hedgehog. The human remains were all much broken and scattered pell-mell, showing that they were not deposited in the flesh. The cave was inhabited up to the Early Iron Age, as proved by the discovery of the bone handle of a knife ornamented with incised concentric circles, and an amber bead. Among other relics are a polished stone celt, chisels of bone and stone hammers, but none of Palæolithic types.

The most interesting result of the excavations of the cave was evidence that the Irish elk was not extinct in this part of Ireland when Neolithic man appeared on the scene (*Scientific Trans. Roy. Dublin Soc.*, vol. i., pp. 177-226).

In another cave at Shandon, near Dungarvan, remains of the brown bear (*U. arctos*), mammoth, reindeer, and horse were discovered in 1859 by Mr Brenan (*Journ. Roy. Dub. Soc.*, vol. ii.).

The Tilbury Skeleton.

In 1883, parts of a human skeleton consisting of the skull, lower jaw, the femurs, tibias, the right humerus, the left radius and ulna, and portion of the pelvis, were disinterred from a bank of sand, at a depth of 34 feet from the surface, while excavating the Tilbury Docks. The bones were submitted to Professor Owen, who described them as the remains of a Palæolithic man (Owen, *Antiquity of Tilbury Man*, London, 1884). They were embedded in the sand to the extent of 20 inches, and the superincumbent deposits consisted of a succession of strata of clay, mud, peat, sand, etc., which prove that a long time elapsed since the body became covered up by the sand. The skull (Fig. 20) is imperfect, the portion from the forehead to the mouth being absent, but sufficient remained to show that it is dolichocephalic, with length-breadth diameters of 186 and 141 millimetres (cephalic index 75.8). The forehead is slightly retreating and the superciliary arches heavy and prominent, but the chin is well formed. The olecranon fossa of the humerus is not perforated. The femurs are strong, thick bones, and the left has the peculiarity of having a tuberosity between the large

and small trochanters. The tibiae are platycnemic, *i.e.*, unusually flattened along the antero-posterior diameter—a feature which, if characteristic of any people, has been more frequently observed in Neolithic than either in modern or Palæolithic races. Upon the whole, there is nothing in the osteological characters of the Tilbury skeleton sufficiently pronounced, independent of the circumstances under which it had been found, which entitles us to relegate its original owner to any particular stage in the Prehistoric period.

Having occasion some years ago to make inquiry as to the date of upheaval of the last raised beaches represented by

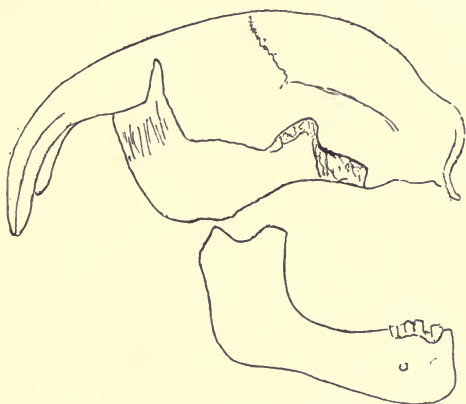


FIG. 20.—Outline of Human Skull found at Tilbury. (After Owen.)

the 25-feet terraces, so well known to geologists as fringing the winding shores of the firths of central Scotland, I came to the conclusion that the process of elevation had ceased about the beginning of the Bronze Age (*Proc. Roy. Soc.*, Edinburgh, vol. xxv., pp. 242-272, 1904). When it commenced there is little evidence to show, beyond the fact that it was “posterior to the stranding of the school of whales on the tidal shore of the shallow inland sea which then covered the Carse lands to the west of Stirling.”

The only implements associated with the skeletons of these whales were perforated axe-hammers or clubs (Fig. 118), made of stag's horn, indicating the transition period between the Palæolithic and Neolithic civilisations. Contemporary with this elevation in North Britain there was a corresponding sub-

mergence of the land going on in the south of the island (see *Archæological Journal*, 1898, p. 275). When the Tilbury man became embedded in the sandbank the spot would be on a level with the bank of the Thames, but since then beds of river mud and growing peat, amounting to 34 feet in depth, have accumulated over the skeleton. This accumulation took place by the ordinary natural agencies during the process of gradual submergence. We know, however, that the action of subsidence ceased before the Roman occupation, as the Red Hills of Essex, in which are found both late Celtic and Roman remains, are scarcely above the ordinary level of present tides. The problem to be solved is, therefore, how long before the Roman period, or rather before the Bronze Age has it taken, under ordinary physical conditions, to accumulate the 34 feet of deposits under which the Tilbury man lay. It is impossible to assign a date that makes him later than the beginning of the Neolithic period.

Mr T. V. Holmes, who expressly examined the geological features of the locality, came to the conclusion that the skeleton, though very ancient, belonged to the Neolithic period (*Trans. Essex Field Club*, iv., 135). On the other hand, Mr Spurrell, F.G.S., whose intimate knowledge of the estuary of the Thames and its alluvium is well known, expressed the opinion that "the Tilbury man may have been contemporary with the mammoth." On the whole it appeared to him safer to assign the skeleton to a middle or transitional position (*On the Estuary of the Thames and its Alluvium*, p. 17). Mr Spurrell's opinion seems to me to be the most feasible explanation of the chronological horizon of the Tilbury man, who would, therefore, represent a later and a more highly developed population than either the river-drift men or the cave-dwellers.

Bury St Edmunds Skull.

In 1884 Mr Henry Prigg discovered a fragment of a human skull of the Neanderthal type in brick-earth, at a depth of $7\frac{1}{2}$ feet from the surface, at Westley, near Bury St Edmunds. The fragment was greatly elongated, being especially developed in the occipital region, but too imperfect to give any idea of the general form of the cranium. It is figured by Mr W. G. Smith

in *Man, the Primeval Savage*. The bed in which it lay consisted of red loam, filling a pocket in the chalk, and about 100 feet above the level of the Lark at Fornham. The section from above downwards showed 18 inches of surface soil, 8 feet of red loam, and then a brown loam with angular gravels. Two of the flint implements are here figured, from which it will be seen that they belong to well-known types of the Acheuléen or



FIG. 21.—Two Flint Implements from the Gravel-pits at Bury St Edmunds ($\frac{1}{3}$ natural size).
(After H. Prigg.)

early Moustérien age (Fig. 21). Similar pockets on the same hill are said to have furnished Palæolithic implements, grinders of the mammoth, and also the skeleton of a man at a depth of 8 feet (*Journ. Anthropol. Inst.*, vol. xiv., p. 51).

The Galley Hill Skeleton.

A human skull and limb-bones found in the Palæolithic terrace-gravel at Galley Hill, Kent, have been described by Mr E. T. Newton, F.R.S., F.G.S., in the *Quarterly Journal of the Geological Society* for August 1895. According to this report the bones now in question were unearthed as far back as September 1888, under the following circumstances, as narrated by parties who had seen them *in situ*.

1. Extract from a letter to Mr Newton by Mr Robert Elliot, Camberwell, dated July 1894:—

It was my custom to visit the pits at Milton Street, Swanscombe, Galley Hill, and neighbouring excavations, every fortnight regularly (in search of flint

implements) for more than two years before the discovery of the human remains, so that I was well acquainted with the pit beforehand.

In 1888 the chalk-pit itself was considerably smaller than now, and was constantly worked for chalk, used in the cement works, the gravels on the top being removed and "screened" on the spot. Thus the removal of the gravel had to keep pace with the excavations of the chalk beneath, so that several tons were removed daily and carted away.

It was on one of my fortnightly visits that I was informed by a man, named Jack Allsop (who had for a long time looked out and saved for me any implements or stones of similar shape, obtained while screening the ballast), that he had found a skull under the gravel. This I could hardly credit at first; but on my asking him to show it to me, he produced it in several pieces from the base of a pillar of laminated clay and sand, where he had hidden it. I asked where the rest of the bones were; he pointed to the section opposite this pillar, and a few feet from it, and told me that he had left the other bones undisturbed for me to see; and there, sure enough, about 2 feet from the top of the chalk, and 8 feet from the top of the gravel, portions of bone were projecting from a matrix of clayey loam and sand. He also told me that several of the men employed at the works, the master of the neighbouring schools, and others, had seen the skull.

The section of gravel was 10 or 11 feet thick, and extended for a considerable distance along the south and east end of the pit—several pot-holes or pipes running from it deep into the chalk.

I carefully examined the section on either side of the remains, for some distance, drawing the attention of my son Richard, who was with me, and of Jack Allsop, to it. It presented an unbroken face of gravel stratified horizontally in bands of sand, small shingle, gravel, and, lower down, beds of clay and clayey loam, with occasional stones in it—and it was in and below this that the remains were found. We carefully looked for any signs of the section being disturbed, but failed—the stratification being unbroken, and much the same as the section in the angle of the pit remaining to this day, but it was then clear, and not covered by rubbish as it now is in places, all the "callow" and loam at the top being at that time removed to allow of the gravel being got at.

2. Extract from a letter to Mr Newton by Matthew H. Heys, Greenhithe, who was master of the neighbouring school above referred to, dated February 1895:—

In reply to your enquiries concerning the skull found in this immediate neighbourhood, I have to say that my attention was called to the spot by the workman who unearthed it, and before it was removed from its long resting-place. For the moment I was tempted to appropriate it there and then, but when I examined it more carefully I was struck by the undisturbed condition of the gravel in which it was embedded: it seemed as though gravel and skull were deposited at the same time.

Since 1888 the gravel-beds in which the bones were found

have been entirely removed, and the face of the pit, at the time of Mr Newton's description, is stated to have been 10 feet removed from the exact spot in which the bones were embedded (Fig. 22); so that there is no possibility of verifying the above statements by any further inspection of the locality. It may, however, be of some interest to note that they stood some

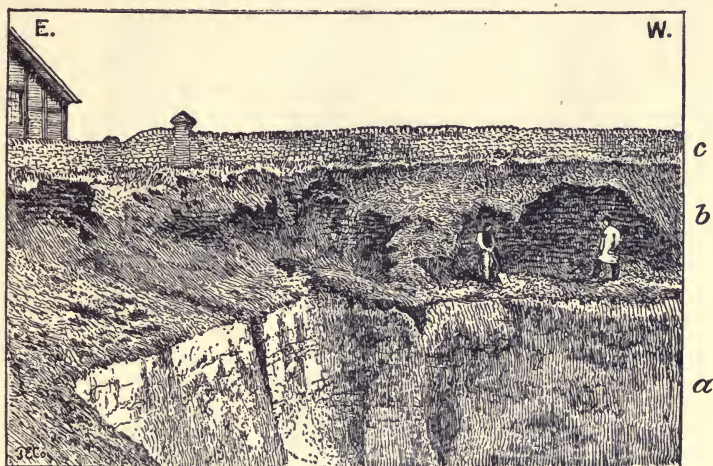


FIG. 22.—View of Chalk and Gravel Pit at Galley Hill.
(From photo by Mr Clement Reid and Mr J. W. Reid.)

a =chalk; b =gravel; c =wall, behind which is the highroad.

The figure on the right is represented as standing on the spot where the human remains were found.

90 feet above the Thames, and that the contiguous gravels have frequently yielded specimens of flint implements of the usual Palæolithic types (Fig. 23).

The above evidence, the *bona fides* of which cannot be questioned, goes strongly to support the view that this skeleton was contemporary with the deposition of the gravel; in which case there can be no doubt that we have in it the remains of a genuine specimen of the Palæolithic men who inhabited the south of England, and manufactured flint implements and weapons when these old rivers stood at their high-level marks. On the other hand, the theory that it was a subsequent interment has, in the hands of an objector, a certain *locus standi* which cannot be contradicted by any direct evidence, since the column of earth above the skeleton had been removed before either of the above-named witnesses came upon the scene. The following remarks by Sir John Evans, made in

the course of the discussion on Mr Newton's paper, cover, I think, all that need be said on this point :—

"Sir John Evans expressed his high appreciation of the great care and wealth of detail that Mr Newton's paper exhibited. It seemed to him that the communication might be divided into two absolutely distinct sections—the one anthropological, the other geological. It was on the latter branch of the

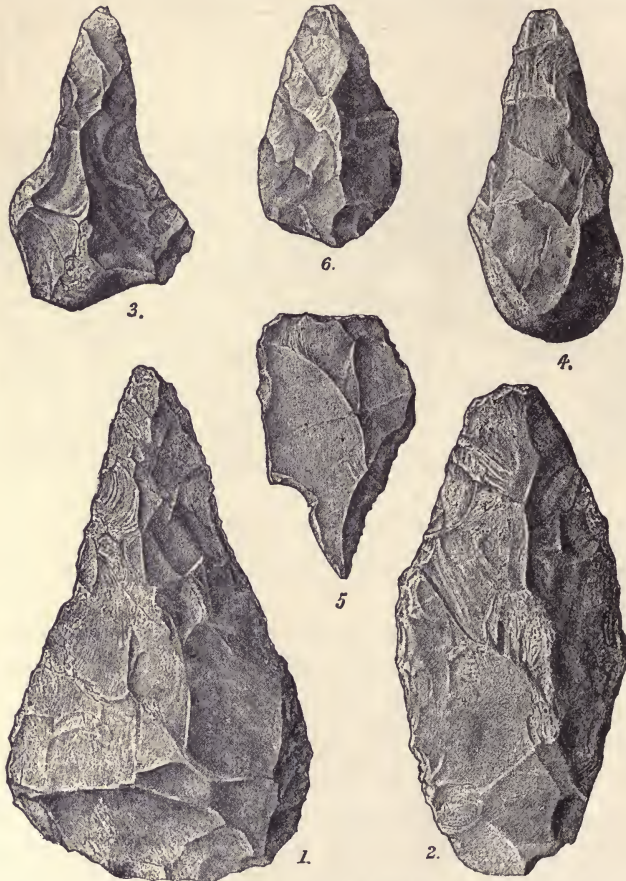


FIG. 23.—Palæolithic Flint Implements from the Terrace-gravel at Galley Hill ($\frac{1}{2}$).

subject only that he proposed to say a few words. There could be, he thought, no doubt of the deposits at and near Swanscombe being true Pleistocene high-level gravels of the valley of the Thames; and the abundance of Palæolithic implements that occurred in them seemed to place their age beyond all doubt. With regard to the human remains, the real question at issue was whether they were deposited where found with the other constituent parts of the gravel, or not. It was unfortunate that so long a period had elapsed between the discovery of the bones and the attention of geologists

being called to it. The evidence, however, of the undisturbed character of the beds seemed fairly strong, though, so far as he had understood the paper, one witness described the bones as having been found in gravel and the other in loam. Perhaps, however, both might mean the same deposit. The fact that the remains were found not at the base of the gravels, like other bones from the same locality, but some few feet above the chalk, was noteworthy ; but what weighed most with him, and led him to doubt whether the bones were of the same age as the gravels, was the fact that nearly the whole skeleton, including the lower jaw and clavicle, had been preserved. Although occasionally in brick-earth the bones of a limb might have been found together, it might be regarded as almost if not quite universally the case that in gravels isolated bones only were found. The occurrence of a nearly perfect skeleton was suggestive of an interment ; and the accumulation of surface-soil above the gravel might give the grave in which the body was deposited an appearance of having been of greater depth than it actually was. On the whole, he ventured to maintain an attitude of doubt, and would await further evidence before absolutely accepting these human remains, however ancient, as being of necessity contemporaneous with the beds in which they were found."

The general features presented by the portions of the skeleton which came into Mr Newton's hands are thus described :—

"All the bones are much decayed and denuded, while their outer surfaces are marked all over by vermiform depressions, such as are generally thought to be the result of close contact with the rootlets of growing plants. When first exhumed the bones were exceedingly soft and fragile, and in spite of the care with which they were handled, were all much broken in the process of extraction from the matrix ; it was necessary, therefore, to treat them with gelatine and allow them to dry and harden before they could be joined together and rendered fit for study. The presence of the last true molar, or wisdom tooth, with the crown somewhat worn, shows that the skeleton belonged to a fully grown adult, though probably not an aged individual."

From these remarks it is manifest that the human remains in question are of great antiquity, and although their contemporaneity with the natural deposition of the gravels in which they were found remains *sub judice*, they are not for this reason to be tossed aside as having no anthropological value. If it can be shown that the anatomical characters of this skeleton are not actually inconsistent with those of one or other of Palæolithic races already known to us, we really establish a *prima facie* argument in favour of the opinion that it belonged to the same chronological horizon. Bearing in mind the views advanced elsewhere in regard to the morphological changes incidental to the erect posture, it will only be necessary here to

review the special features of the cranium and lower jaw. In Mr Newton's carefully prepared description of this skeleton there is not the slightest suspicion of special pleading, so that we may unreservedly accept his measurements of the skull as the most accurate that could be procured under the circumstances. Here are his words:—

"The calvarium was fortunately less broken than the long bones: it is evident, however, that in drying it has become twisted somewhat; but its general characters are clearly shown. The base and facial portions of the skull are wanting, as well as much of the left side; the right side, however, is more perfect, the outer part of the orbit, with the maxilla and jugal bones, being all that is really absent. A portion of the foramen magnum is preserved, with sufficient of the supraoccipital bone to show the form of the under and back parts of the brain case.

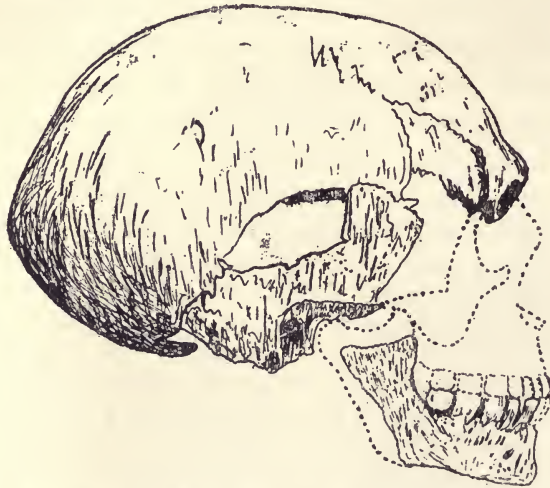


FIG. 24.—Galley Hill Skull, side view ($\frac{1}{2}$). (After E. T. Newton.)

"The most striking features of this skull (Fig. 24) are its extreme length (205 mm.) in proportion to its width (about 130 mm.?), the complete obliteration of the coronal, sagittal, and lambdoidal sutures, both internally and externally, and the prominence of the superciliary ridges. The extreme narrowness of the cranium is best seen when viewed from above; but this peculiarity is somewhat exaggerated by the distortion which the skull has undergone, the right temporal bone, and the parts posterior to it, being pushed over towards the left side; and besides this, parts of the left side are wanting. The greatest width of the skull is low down near the mastoid region, but its imperfections prevent the exact width from being measured.

"The walls of the cranium are in most parts very thick, the middle of each frontal measuring as much as 12 mm. The superciliary ridges are very strongly developed, especially at their inner part, although now in a denuded condition;

probably they were never so prominent as in the famous Neanderthal calvaria. The frontals are fairly full, and the forehead therefore only moderately receding. The highest point of the skull is in the fore part of the parietal region. The temporal ridge is not strongly marked, but extends abnormally high up on the side of the skull. The right parietal is somewhat inflated at its anterior and lower part, and this inflation is continued on to the adjoining lower part of the frontal, causing a prominent stephanic region. Towards its hinder part likewise the parietal is prominent. The occipital bone forms a well-marked boss or probosc at the back of the skull, its upper part being directed well forward as well as upward; and this portion, together with the median and hinder ends of the parietals, forms a distinctly flattened area."

Its dimensions, so far as could be determined by measurements, are thus given in millimetres: circumference, 540; length, 205; breadth, 130 (?); height, 137 (?); cephalic index, 64; from which it will be seen that this skull is extremely dolichocephalic, indeed more so than that of Neanderthal or those of Spy.

Dr Garson summed up the special characters of the skeleton as follows:—the short stature, the very dolichocephalic skull, the prominent glabella and superciliary ridges, and the well-marked ridges of the skull generally, the absence of prominence of the chin, and the large size of the last molar tooth, which was as large as, if not larger than, the first molar. The large size of the head of the femur was also peculiar.

Under these circumstances it is manifest that no important deductions can be founded on the anatomical characters of the Galley Hill skull beyond the fact that, like the other well-attested Quaternary skulls, it is dolichocephalic, and shows similar peculiarities both as regards the receding forehead and the angular prominence of the occiput. It is a more highly developed skull than the more recently discovered specimens of the Neanderthal-Spy race, such as those of Chapelle-aux-Saints, Moustier, Krapina, Quina, etc. But if any cranial expansion is to be allowed for mental development during the Palæolithic period, which lasted for incalculable ages, such differences are to be expected in fossil skulls. The Galley Hill skull seems to me to have a parallel in that of Brünn (see p. 171) with respect to their osteological characters. The greater prominence in their frontal portion may, therefore, be accounted for by their belonging to a later age than most of the recorded examples of the Neanderthal-Spy race.

2. DISCOVERIES IN BELGIUM.

Notwithstanding Dr Schmerling's early researches it was not till the latter part of 1863, when the din of strife and sensational discoveries in other countries echoed far and wide, that the Belgian authorities became alive to the importance of their caverns. Some of the leading savants, stung with reproach for having left it to foreigners to recognise the true significance of their famous countryman's early discoveries, conceived the project of exploring the caverns on the banks of the Meuse, and especially its tributaries the Molinee and Lesse, on a scale commensurate with the acknowledged importance of the subject. M. Vandenpeereboom, the Minister of the Interior, to whom the matter was referred by the Academy of Science, at once undertook to supply the necessary funds. On the recommendation of Professor Van Beneden, M. E. Dupont was engaged to conduct the proposed investigations. Active operations were begun in 1864 and continued for seven years, during which time upwards of sixty caverns were explored. Nearly 40,000 bones were examined anatomically, and classified under their respective species; while not less than 80,000 worked flints were collected. Judging from the work done at Furfooz in clearing out the Grotte des Nutons and the Trou du Frontal, the only two stations I have had an opportunity of inspecting, the labour must have been very arduous. Dr Dupont classified all the relics found in these caves under the following consecutive ages.

1. *Age du Mammoth*.—The relics associated with the mammoth and other Quaternary fauna were found to be lowest, and coeval with the time when the swollen rivers occasionally overflowed into the caves, and left stratified beds of gravel or mud over their floors.

2. *Age du Renne*.—The period when the rivers, by excavating the valleys more deeply, ceased their fluvial deposits in the caverns, and so left them above the highest ordinary flood-marks. The portion of debris representing this stage was characterised by the presence of angular blocks mixed with brick-earth. The extinct animals—mammoth, rhinoceros, Irish elk, hyæna, cave-lion, and cave-bear, are no longer represented.

Of the fauna of the previous age the reindeer is the most characteristic which still survives, and hence the reason for giving to this stage of culture the name Reindeer Period.

3. *Époque actuelle*.—The superficial blackish débris of the upper strata he assigned to Neolithic and modern times, when the reindeer also vanished from the locality.

M. Dupont, in his excellent memoir *Les Temps Pré-historiques en Belgique*, engraves some objects made of reindeer horn, which he assigns to the mammoth period (Fig. 25).

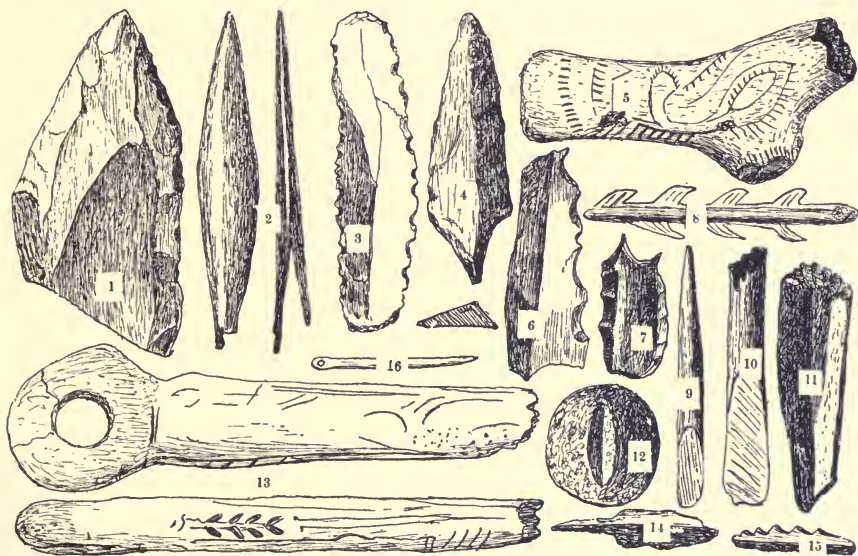


FIG. 25.—Relics of the Mammoth and Reindeer Periods in Belgium (all $\frac{1}{2}$.)
(After Dupont.)

Trou de Sureau (1, 2); Pont-à-Lesse (3, 4, 5); Goyet (8, 13); Trou de Chaleux (6, 7, 9-12, 14-16).

There are a few harpoons and spear-points (Nos. 2, 8, 9, and 10), a *bâton de commandement* (No. 13), a needle (No. 16), some articles showing efforts at rudimentary carving (No. 5), also a doll-like object suggesting an attempt at modelling the human body (Pl. XXVIII., No. 5). The flint relics from the reindeer period are said to manifest greater skill in their manufacture (Nos. 1, 3, 4, 6, 11, 15), especially in the process of secondary chipping. Fragments of coarse pottery have also been noted; but only in one instance were the pieces sufficient to determine the contour of the vessel (Fig. 27). But it is to Neolithic man,

who also haunted these retreats, that we must assign the earthenware as well as the sepulchral remains of the brachycephalic race found in the Trou du Frontal. The entire collection of relics from these caverns is preserved and well exhibited in the Royal Museum of Natural History in Brussels. Besides tickets describing the bones anatomically and zoologically, there are skeletons, plans, and geological sections of the different caverns, so that at a glance the visitor can have a fair idea of the character of the remains. In addition to the cave relics there is in the same place another collection of roughly chipped flint instruments from Mesvin, near Mons (Pl. XII.). These were found in a gravelly stratum resting immediately over Tertiary deposits, but below two distinct beds of mud. The special interest attached to them lies in the fact that in the same stratum were found the bones of some of the extinct Quaternary fauna—thus proving that in structure, position, and association, these flints belong to the Palæolithic period.

Among the caverns investigated by M. Dupont and classified under the mammoth age, the following are the more important :—*Trous de l'Érable, du Sureau, du Chêne, du Lierre, and Philippe*, on the river Molignée; *Les trous Magrite, de la Naulette, Balleux, de Chaleux, de l'Hyène, de l'Ours, des Nutons, du Frontal, etc.*, on the banks of the Lesse above Dinant. Beyond these two localities only one other important station was excavated, viz., *Caverne de Goyet*, on a tributary of the Meuse called Samson.

The stations which are classed as containing relics of the reindeer age are Trous de Nutons, du Frontal, de Chaleux, Rosette, and Reuviau.

Only two of these early inhabited sites contained human bones sufficiently well preserved to be of scientific value, viz., Trou de la Naulette and Trou du Frontal. Remains of four human skeletons were found in the Trou Rosette, but no satisfactory explanation of their presence could be suggested. Some fragments were also found in the kitchen-midden at Goyet.

Trou de la Naulette.

The cave of Naulette, situated on the left bank of the river Lesse, near Dinant, has a straight entrance gallery terminating

in a dark chamber of considerable dimensions. On the irregular floor of the chamber a mass of fluvial deposits, to the depth of 11 metres, had accumulated. The entrance at present stands 28 metres above the bed of the river, but it was evident from the nature of the débris inside that at some former period the water had free access to the cavern. Subsequently there came a time when it entered only occasionally, supposed to be during abnormally high floods. This inference was based on the fact that intercalated with the stratified beds in its upper portion were seven layers of stalagmite. (Dupont, *loc. cit.*, p. 96.)

Bones were found immediately above the first, second, and seventh of these stalagmitic floors; and it was over the second, counting from below, or below the fifth, counting from above, at a depth of about 4.50 metres from the surface of the floor of the cave that the famous Naulette jaw (Figs. 2 and 3) was discovered. Scattered through the same horizontal stratum were found three other human bones which might have belonged to the same skeleton—viz., a canine tooth, an ulna, and one of the metatarsal bones: also a large number of bones representing the following animals among others:—Mammoth (1), rhinoceros (3), horse (2), wild boar (3), small ox (1), goat (5), chamois (2), reindeer (3), stag (2), hare (5), brown bear (3), wolf (3), fox (4), dog (2), etc. (The figures after the names indicate the number of individuals identified.)

M. Dupont states that there can be no doubt that most of these animals formed the food of man in the cave, as their remains consisted mostly of broken skulls and limb-bones—the latter being split longitudinally for the purpose of extracting the marrow. Some of the bones actually showed the marks of the blows by which they had been broken, and one piece had an artificial perforation.

But it is the human jaw which gives to this find its special importance. Though, unfortunately, only a fragment, it presents certain peculiarities which in a very marked degree differentiate it from the corresponding bone in modern races. These may be stated as follows:—

1. Its small height in proportion to the thickness of the body gives it an exceptionally stumpy appearance.

2. The chin, instead of projecting forward, slopes back-

wards; and the "genial tubercles" on its inner surface are entirely wanting.

3. All the teeth are absent from this jaw, but as will be seen from their sockets the posterior molar or wisdom tooth was larger than the two molars anterior to it, a fact said to be the reverse of what is to be found in modern races. Further, the former shows the impression of five roots—a peculiarity which, according to Dr Hamy (*Pal. Humaine*, p. 234), is very rarely observed in modern man except amongst the lowest races. Also, the extremities of the alveolar arch come closer to each other than in the ordinary human jaw, a feature which gives the entire curve the appearance of a horse-shoe.

Specialists in comparative anatomy regard all these peculiarities as simian characteristics. Dr Broca informs us that, although they have all been observed more or less in other human jaws, they have never before been known to be all conjoined in the same specimen. Hence he concludes that the Naulette jaw, in its anatomical characters, approaches the simian type more than any hitherto known. "Nous serons autorisés à conclure," says he, "que cette mâchoire, dont l'antiquité prodigieuse remonte au temps du Mammouth, est de tous les restes humains que l'on connaît jusqu'ici, celui qui se rapproche le plus du type des singes." (*C.A.P.*, 1867, p. 401.)

With respect to the retreating slope of the chin, and the character of the teeth, he considers that the individual who owned the Naulette jaw held an intermediate place between man and the anthropoid apes; and in support of this view he gives an outline sketch (Fig. 4) of a number of human jaws showing a regular upward gradation from the chimpanzee to a modern Parisian.

Trou du Frontal.

M. Dupont describes the Trou du Frontal as the burying-place of the reindeer-hunters inhabiting the Trou des Nutons, the latter being a large cavern situated about 200 metres lower down the valley. The former is a small recess at the end of a rock-shelter which had in front of it deposits containing relics of different ages. The cavity measured 2 metres in depth and 1 metre in height and breadth, and contained the remains of sixteen human skeletons, five being those of children. The bones were

disconnected before being deposited, as none was in its normal anatomical position. A human jaw, for instance, had been broken into two portions, one, having a whitish appearance, lay in one part of the vault, and the other, having a brown colour, was found at some distance from the former, but yet when



Fig. 1. a

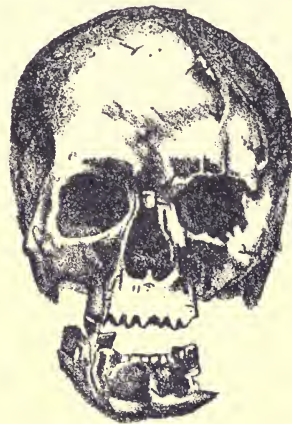


Fig. 2. a



Fig. 1. b.



Fig. 2. b.

FIG. 26.—Two Brachycephalic Skulls from Trou du Frontal, near Furfooz, one female (1) and the other male (2).

brought into contact the portions fitted exactly. A large slab placed in front converted the recess into an ossuary. The skeletons were pronounced by Pruner-Bey to belong to a Mongoloid race. The skulls were apparently of a mixed character—more brachycephalic than dolichocephalic—but only two (Fig. 26), a male and female, were sufficiently entire to

yield correct anatomical details (*C.A.P.*, 1867, p. 347). At the entrance to the cave, and inside it, were found some twenty



FIG. 27.—Reconstructed Vase of fragments of pottery found in Trou du Frontal, about 12 inches in diameter. (After Dupont.)

worked flints, perforated pendants of fluorine, many shells from Eocene formations (perforated), two plaques of sandstone with incised ornamentations, and a globular vessel or urn restored from fragments of coarse pottery (Fig. 27). Dupont, probably influenced by Lartet's opinion of the analogous sepulchral cavern of Aurignac, regarded the Trou du Frontal as a cemetery of the Palæolithic hunters of the reindeer period. But, judging from the brachycephalism of the skulls, the pottery, and the associated relics, it is now generally believed to have belonged to the early Neolithic age. (*L'Homme pendant les Âges de la Pierre*, p. 195 et seq.)

Caverns of Goyet, Trou Magrite, etc.

The station of Goyet (Namur) was one of a series of caverns connected by passages in which a number of objects of the Magdalénien epoch were disinterred, including a *bâton de commandement*, a barbed harpoon, and needles made of reindeer horn, together with flint implements mostly of Moustérien types. These objects were interspersed in débris of human habitation, intercalated with five fluviatile strata caused by river flooding, thus representing different chronological levels ranging from Moustérien to Neolithic times. Fragments of human bones were scattered throughout the débris in such a manner as to suggest that the carnivorous animals which frequented the cavern had here feasted on human flesh. Among the predominant fauna were the following:—Cave-bear (26 individuals), hyæna (12), mammoth (7), horse (18), reindeer (20), rhinoceros (4), stag (2), etc.

The Trou Magrite (Pont-à-Lesse) presented very favourable conditions for human habitation, being dry, spacious, and



Flint Implements from Belgian Caverns and the Alluvial Deposits of Mesvin.
 Trou de Chaleux, 1-9; Caverne de Goyet, 10-18; Mesvin, 19-23. (All $\frac{1}{2}$.)



well lighted. Among the objects from this site are two which show that the troglodytes in this locality had some knowledge of art, viz., a small figurine in human form sculptured from a portion of a reindeer horn (Pl. XXVIII., No. 5), and another portion of the same material engraved with incised lines, forming some kind of ornament (Fig. 25, No. 5).

Among other caves from which interesting relics were obtained may be mentioned the Trou du Sureau. Besides flint implements this cave yielded a dart split at the base like that regarded as characteristic of the station of Aurignac, in France (Fig. 25, No. 2).

M. Dupont advocated, on archæological and palæontological grounds, that the inhabitants who left remains of their handiworks in the open-air stations of Belgium were contemporary with those who frequented the neighbouring caverns. In support of this opinion he argues that the alluvial deposits of Mesvin, situated 20 metres above the river Nouvelles, have furnished bones of the following animals :—*Ursus spelæus*, *Felis spelæa*, *Elephas primigenius*, *Rhinoceros tichorhinus*, *Equus caballus*, *Cervus megaceros*, *C. tarandus*, *Bison europæus*. These eight animals are also represented in the alluvial deposits within the caverns. It is not less significant that this fauna has only changed, subsequent to the formation of these fluviatile deposits in the caverns, as proved by their contents when excavated in the valley of the Lesse (*C.A.P.*, 1872, p. 461).

On Pl. XIII. are depicted a few specimens of flint implements from the lower deposits of Mesvin, and the caves of Goyet (Age du Mammouth) and Chaleux (Age du Renne), for the purpose of showing that the flint industry of Belgium was pretty similar to that of the river-drift beds and inhabited caves of England and Central Europe.

Les Hommes de Spy.

In 1886 two skeletons were found deeply buried in undisturbed débris at the entrance to a grotto called Belche-aux-Roches, at Spy-sur-l'Orneau, in the province of Namur. The interior of the grotto had been examined more than once, but in front of it there was a terrace, projecting 13 yards, which had not been previously excavated. It was in this terrace that

15

MM. Lohest and De Puydt made excavations which unearthed the skeletons. The outer skeleton was found at a distance of 26 feet from the entrance to the cave, under a mass of rubbish 12 feet 6 inches in depth, composed of four distinct strata, none of which appeared to have been hitherto broken through. It lay on the right side, across the axis of the cave, with the hand supporting the lower jaw, and the head towards the east. The other skeleton was 8 feet nearer the entrance to the cave, but its position was not determined with so much care as the first

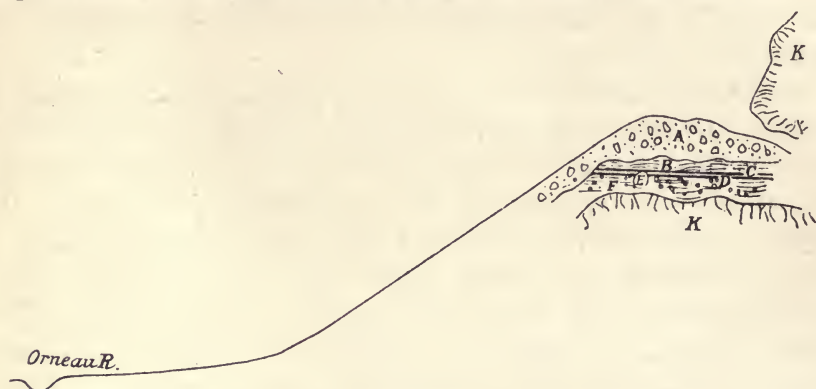


FIG. 28.—Section of the Grotte de Spy.

named. Associated with these skeletons, on the same stratum, were worked flints of the Moustérien type together with animal remains representing the following fauna :—

Rhinoceros tichorhinus (abundant).

Equus caballus (very abundant).

Cervus elephas (rare).

Cervus tarandus (very rare).

Bos primigenius (fairly abundant).

Elephas primigenius (abundant).

Ursus spelæus (rare).

Meles taxus (rare).

Hyæna spelæa (abundant). (C.A.P., 1889, p. 322.)

Immediately above the skeletons was a hardened layer composed of chippings of ivory and flint, pieces of charcoal, and some angular stones of the surrounding limestone rock. Above this there was a reddish deposit containing the remains of the same fauna, but the worked objects indicated a decided advance

in civilisation—awls and borers of flint; needles, beads, and ornaments of bone and ivory. Over this came a bed of yellowish clay in which were still found bones of the mammoth as well as flint implements. And, finally, there was a mass of clay and fallen rocks without relics of any kind. (See section of the cave, Fig. 28.)

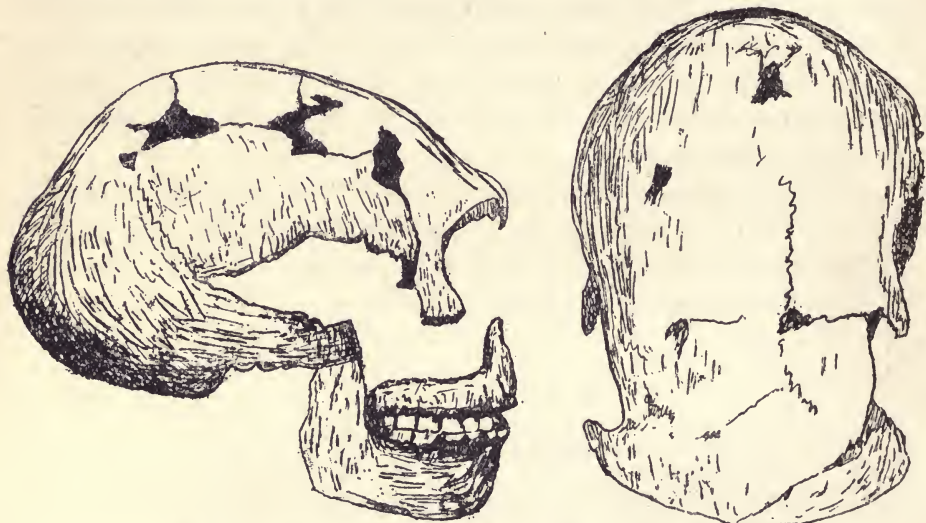
The supposition that these bodies were buried in graves dug for the purpose is, according to MM. Fraipont and Lohest, inadmissible. The most reasonable explanation that can be given is that the Spy men died in front of the grotto which had served as their place of abode, on the soil which had partly accumulated from their kitchen débris. (*Archives de Biologie de Gand*, 1886, p. 668.)

The osteological characters of one of the Spy crania (Figs. 29 and 30) correspond in a remarkable degree with those of the Neanderthal skull, as will be seen from a few of Professor Fraipont's comparative measurements :—

| | Spy. | Neanderthal. |
|------------------------------------|------|--------------|
| | mm. | mm. |
| Antero-posterior diameter (max.) | 200 | 200 |
| Transverse | 140 | 144 |
| Frontal (min.) | 104 | 106 |
| " (max.) | 114 | 122 |
| Horizontal circumference | 580 | 590 (571 ?) |
| Cephalic index | 70 | 72 |

As regards the great development of the superciliary prominences, the low retreating forehead, the depressed and elongated form of the cranium, both these skulls present a more brutal appearance than any human skull known up to the time of the Java discovery. The fragmentary condition of the Neanderthal skull prevents us carrying the comparison any further. The Spy skull was associated with nearly the whole skeleton, and, according to Fraipont, its entire anatomical characters bear out the same lowness of type. The jaws are deep and powerful, the chin slopes away from the teeth downwards and backwards, and the teeth and alveolar border have a striking prognathic appearance. The last molar teeth do not sensibly differ in size from those immediately in front of them. The long bones differ materially from those of the

Belgians of the present day, being generally shorter and stouter. The bones of the thigh and forearm have a curiously bent appearance, and the lower ends of the former are so fashioned as to prevent the limb being fully straightened. It is, however, but just to say that, so far as the measurements of the other Spy skull could be determined, its pithecoïd characters are less pronounced. The cranial vault is more lofty, and the cephalic index at least 74.



FIGS. 29 and 30.—Side and top views of the Skull (No. 1) from the Grotte de Spy.
(After Fraipont.)

The Belgian professor came to the conclusion that the Spy men belonged to a race relatively of small stature, analogous to the modern Laplanders, having voluminous heads, massive bodies, short arms, and bent legs. They led a sedentary life, frequented caves, manufactured flint implements after the type known as Moustérien, and were contemporary with the mammoth and woolly-haired rhinoceros. From a peculiarly large and slanting appearance of the articular surfaces of the femur and tibia, he drew the inference that the Spy men could not stand perfectly erect. But at the International Congress of Anthropology and Prehistoric Archaeology, held in Paris in 1889, Professor Manouvrier exposed the fallacy of M. Fraipont's argument (*C.A.P.*, 1889, p. 353).

CHAPTER VII

FOSSIL MAN (FRANCE)

The Valley of the Vézère. The Cro-Magnon Skeletons. L'Homme écrasé de Laugerie Basse. Skeleton of Chancelade. Homo Mousteriensis Hauseri. Homo Aurignacensis Hauseri. Skeleton of Chapelle-aux-Saints. Fossil Man of Ferrassie. Skeletons of Grenelle and Clichy. Race de la Truchère. Jaw of Malarnaud. Skulls of Marcilly-sur-Eure and Bréchamps. Cemetery of Duruthy. Human Jaws of Petit-Puymoyen. Skull of Placard. Skeleton of Hoteaux. Skeleton of Moustier-de-Peyzac. The Skeleton of La Quina.

The Valley of the Vézère.

M. LOUIS LARTET, in the preliminary remarks to his admirable description of the Cave of Cro-Magnon and its burial-place, thus writes :—

“Passing from Limoges to Agen by railway for the first time, and traversing the tortuous defiles of Périgord, we cannot but feel surprise and admiration on seeing the Vézère flow in the deep valley whose freshness is in marked contrast with its bare and rocky escarpments (Fig. 31). These picturesque cliffs, sharply limiting the river's course and not infrequently fantastic in shape, attract the traveller's attention, indifferent though he be, by a succession of unexpected and striking effects. Soon the eye becomes familiarised with the forms of the rocks, and we recognise a multitude of cavities in the cliffs. Some of them are natural; others have been carefully worked out by man, and are sometimes even now used as portions of the rural habitations. The Romans, Normans, and English have succeeded one another in this little Périgordian Petra; and the chronicles of the Middle Ages comprise curious documents relative to the part played in the wars of those times by the Roc de Tayac, where we still find cut in the limestone, rooms, galleries and stables, constituting indeed a veritable castle.

“The cave-dwellers, however, the oldest and strangest of all whom these rocks of Tayac have sheltered, were, without doubt, the hunters of the reindeer, who trod our soil when a crowd of strange animals existed here—such as the mammoth, lion, reindeer, musk-ox, aurochs and others, now extinct or completely driven from our climate. The stations of these hunters are numerous on the banks of the Vézère; and the natural caves which served them for

retreats, carefully explored by MM. H. Christy and E. Lartet, have of late years yielded up the secrets of their primitive industry and of their savage life. Little, however, has hitherto been determined as to their ethnic characters—and that only from unsatisfactory specimens, found in possibly abnormal positions. It was therefore with lively curiosity that, towards the end of last March (1868) we were made acquainted with the discovery of some human skeletons in this district, under conditions which cannot fail to prove their high antiquity." (*Reliquiæ Aquitanicæ*, p. 62.)

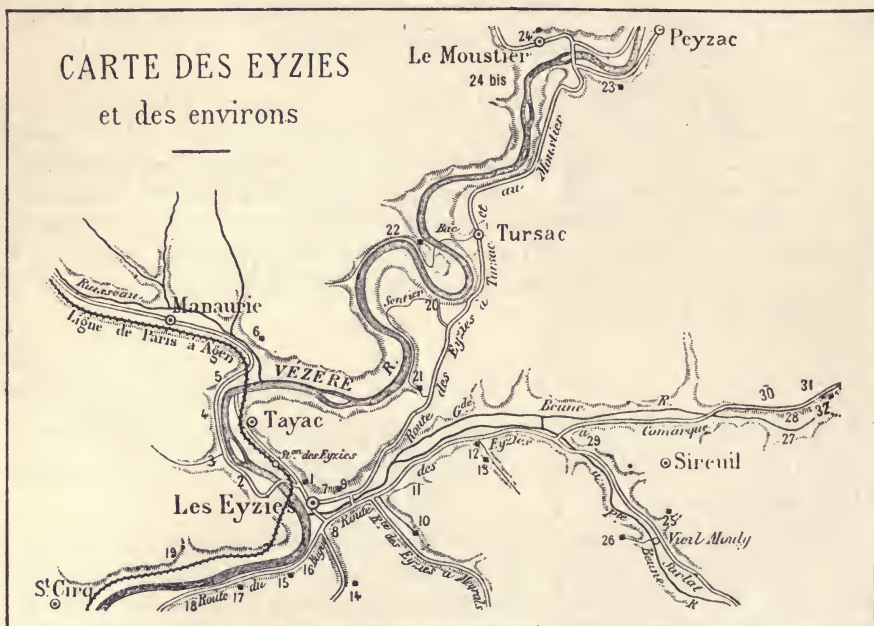


FIG. 31.—From *Guide Illustré*, by M. Peyrony.

- | | | |
|------------------------------|---|-----------------------------------|
| 1. Cro-Magnon. | 12. Grotte Rey. | 22. La Madeleine. |
| 2. Roc de Tayac. | 13. Grotte des Combarelles. | 23. La Roche Saint-Christophe. |
| 3. Gorge d'Enfer. | 14. Grotte de la Mouthe. | 24. Le Moustier. 24 bis. Le Ruth. |
| 4. Laugier Basse. | 15. Eglise de Guilhem. | 25. Grotte de Vieil-Mouly. |
| 5. Laugier Haute. | 16. Cavernes voisines de l'église de Guilhem. | 26. Grotte de Bernifal. |
| 6. La Micoque. | 17. Grotte du Renard. | 27. Château de Comarque. |
| 7. Les Eyzies. | 18. Carrières de kaolin. | 28. Abri du Cap-Blanc. |
| 8. Rocher de la Peine. | 19. Fort du Pech Saint-Sourd. | 29. Station de Cazelle. |
| 9. Grotte des Eyzies. | 20. Château de Marzac. | 30. Grotte de La Grèze. |
| 10. Grotte de Font-de-Gaume. | 21. Liveyre. | 31. Château de Laussel. |
| 11. Les Girouteaux. | | 32. Abri de Laussel. |

The Cro-Magnon Skeletons.

The cave, formed by a ledge projecting from a great rock, occupied a space of some 17 metres in length by 8 metres in depth, at a distance of about 130 metres from the railway station of Les Eyzies. At the base of the rock there is a talus, of which a portion was removed in 1868 for the construction of the railway embankment. During these operations

kitchen débris of the reindeer-hunters was exposed, and at once notice of the discovery was given to the authorities. Investigations followed, by order of the Minister of Public Instruction, under the superintendence of M. Louis Lartet. First of all it was necessary to support the vault of the shelter by a pillar, because of a deep crack which threatened its fall (see Fig. 32). The culture débris and its various

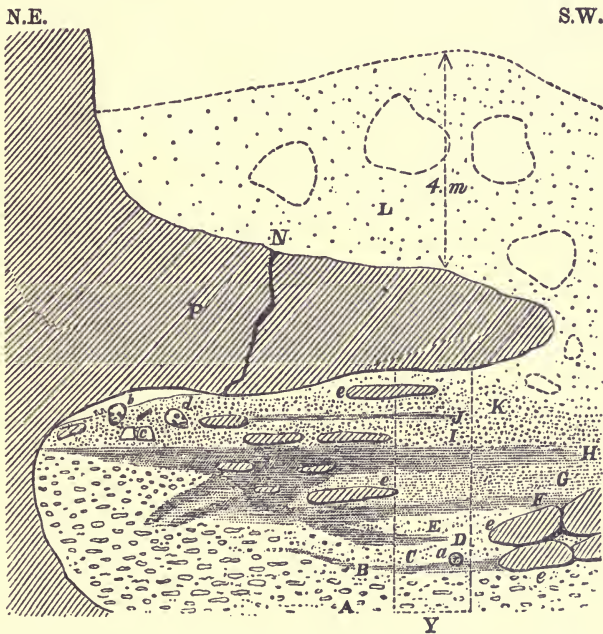


FIG. 32.—Section through the Rock-shelter of Cro-Magnon. (After L. Lartet.)

- | | | |
|--|---|---|
| A Débris of the soft limestone. | I Yellowish earth, with bones, flints, etc. | Y Place of the pillar made to support the roof. |
| B First layer of ashes, etc. | J Thin bed of earth-stuff. | |
| C Calcareous débris. | K Calcareous débris. | a Tusk of an elephant. |
| D Second layer of ashes, etc. | L Rubbish of the talus. | b Bones of an old man. |
| E Calcareous débris reddened by fire. | N Crack in the projecting ledge of rock. | c Block of gneiss. |
| F Third layer of ashes, etc. | P Projecting shelf of hard limestone. | d Human bones. |
| G Red earth, with bones, etc. | | e Slabs of stone fallen from the roof at different times. |
| H Thickest layer of ashes, bones, etc. | | |

contents are sufficiently indicated by the descriptive details of the figure. It was on the surface of the débris at the back part of the cave that the human skeletons were found. Above the projecting rock and all over the shelter lay a subsequent talus, 4 to 6 metres thick, which had accumulated since the

skeletons had been deposited. M. Lartet's description of their position in the cave is as follows :—

“As for the human remains and the position they occupied in bed 1, the following are the results of my careful enquiries in the matter. At the back of the cave was found an old man's skull, which alone was on a level with the surface, in the cavity not filled up in the back of the cave, and was therefore exposed to the calcareous drip from the roof, as is shown by its having a stalagmitic coating on some parts. The other human bones, referable to four other skeletons, were found around the first, within a radius of about 1.50 metres. Among these bones were found, on the left of the old man, the skeleton of a woman, whose skull presents in front a deep wound made by a cutting instrument, but which did not kill her at once, as the bone has been partly repaired within; indeed our physicians think that she survived several weeks. By the side of the woman's skeleton was that of an infant which had not arrived at its full time of foetal development. The other skeletons seem to have been those of men.

“Amidst the human remains lay a multitude of marine shells (about 300) each pierced with a hole, and nearly all belonging to the species *Littorina littorea*, so common on our Atlantic coasts. Some other species, such as *Purpura lapillus*, *Turritella communis*, etc., occur, but in small numbers. These also are perforated, and, like the others, have been used for necklaces, bracelets, or other ornamental attire. Not far from the skeletons, I found a pendant or amulet of ivory, oval, flat, and pierced with two holes. M. Laganne had already discovered a smaller specimen; and M. Ch. Grenier, schoolmaster at Les Eyzies, has kindly given me another quite similar, which he had received from one of his pupils. There were also found near the skeletons several perforated teeth, a large block of gneiss, split and presenting a large smoothed surface; also worked antlers of reindeer, and chipped flints of the same types as those found in the hearth-layers underneath.” (*Ibid.*, p. 70.)

The skull of the “old man” (cephalic index 73.6 and capacity 1590 cubic centimetres) presents osteological characters closely approximating to those of the normal type of modern Europeans (Figs. 33 and 34). From actual measurements the height of this man was calculated to be 1.82 metres. The lower jaw has large ascending rami, behind which the third molars are partly hidden. Moreover, these two teeth, instead of being the same size as the other molars, are smaller—a peculiarity of dentition which is of common occurrence among men of Neolithic times, and normal among modern civilised races. M. Lartet believed that these skeletons belonged to the later Palæolithic people of the locality; but in the opinion of some anthropologists this inference is not justified from the facts. The bodies lay on the surface of the culture strata in a

small open space between it and the roof, the opening to which had been closed by heaping up the Palæolithic débris ; so that the interment could have taken place long after the shelter had

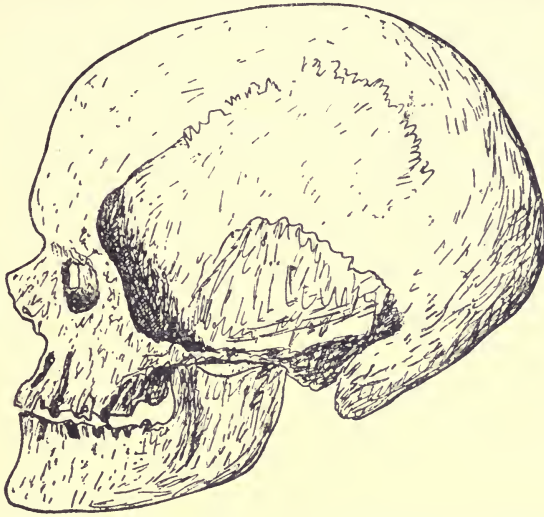


FIG. 33.—Side view of the Skull of the "old man of Cro-Magnon." (*Reliquie Aquitanicæ.*)

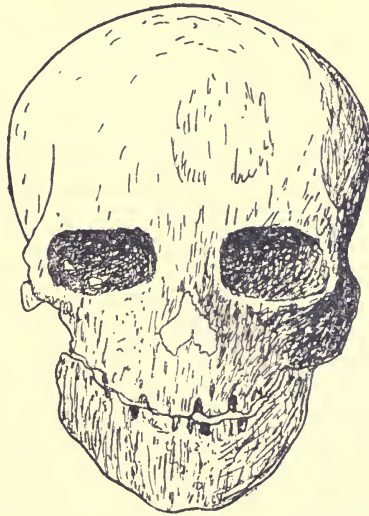


FIG. 34.—Front view of the Skull of the "old man of Cro-Magnon." (*Ibid.*)

ceased to be inhabited. At the time the grave-goods were also supposed to be in keeping with burials of the early Neolithic period ; but this objection is no longer tenable since the

discovery of Palæolithic burials in the Grimaldi caves and elsewhere containing grave-goods precisely similar to those of the Cro-Magnon interment.

L'Homme écrasé de Laugerie Basse.

On the other side of the Vézère (right), and about a dozen kilometres farther up than Les Eyzies, are the two famous stations of Laugerie Basse and Laugerie Haute. Here the rock-shelters are large and the fallen débris particularly abundant, owing to weathering. Laugerie Basse is a large station, and has been more or less excavated by Lartet and Christy, Vibraye and Massénat, all of whom had amassed

A, the skeleton; B B, blocks of fallen rocks; R R' R'', Lower rocks, beneath which the gallery was excavated; F F, Palæolithic hearths; T T, ancient level of talus, cut down to make a sheepfold.

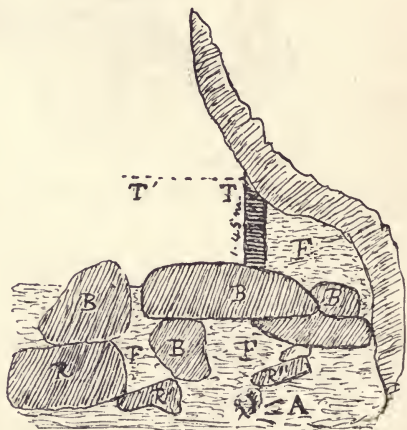


FIG. 35.—Section of the Rock-shelter of Laugerie Basse, showing the position of the crushed skeleton, A. (After R. Aquitanica.)

collections of interesting relics from it. Towards the end of the winter 1872 Massénat found a human skeleton under the following circumstances. After clearing away the usual Magdalénien deposits to a depth of 1.25 metres, there appeared a confused heap of blocks which had evidently fallen from the roof. Below this came another deposit of the débris of occupation, consisting of Magdalénien relics, hearths, charcoal, etc., in which the skeleton was found. The body lay on its left side with the knees bent upwards in front of the breast; the left hand was under the parietal bone, and the right lay on the neck with the elbows almost touching the knees. The bones

were in their anatomical position. A corner of a large block of stone lay over the spine, which in falling had crushed the bones. A number of shells from the Mediterranean were disseminated over the body, which appeared to have adorned the man's dress. The cranium (cephalic index 73.19), though also damaged (Fig. 36), has furnished to the late M. Hamy measurements which clearly correspond with those of the Chancelade skeleton, a later discovery of the same kind. Judging from the length of

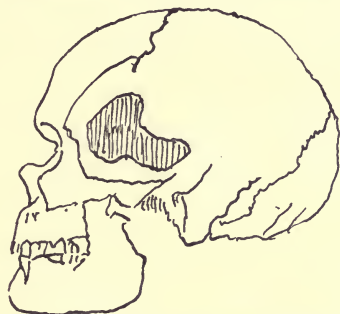


FIG. 36.—Skull of Laugerie Basse.
(Col. Massénat.)



FIG. 37.—Skull of Chancelade.
(After Testut.)

the femur, the height of the crushed man would be about 5 feet $4\frac{1}{2}$ inches. (*Crania Ethnica*, p. 53.)

The explanation of the unfortunate fate of the man to whom the skeleton belonged, is that he was killed during sleep by a sudden fall from the roof, and that consequently he was contemporary with the culture *débris* over which he reposed.

At various points in the talus fragments of human bones—teeth, lower jaws, portions of skulls, and broken long bones—were found. M. Ed. Lartet found a fragment of a lower jaw at the Les Eyzies, where previously portions of human skulls had been found. These are described by M. Hamy in *Reliquiæ Aquitanicæ*, p. 255, *et seq.*)

Chancelade Skeleton.

About 7 kilometres from Périgeaux, on the road to Brantome, Commune of Chancelade (Dordogne), there exist at the foot of the escarpment of Raymondén some deposits of the Magdalénien epoch which had yielded a few worked flints and bones. In October 1888 MM. Féaux and Hardy found a

human skeleton at the bottom of the debris in one of these rock-shelters. The accompanying section (Fig. 38) shows the nature of the deposits under which it lay.

A. A habitable area, with remains of hearths, formed of blackish earth streaked with peroxide of iron, 0.37 metre, resting on the natural rock.

B. The next layer, 0.32 metre thick, consisted of yellowish earth mixed with limestone debris and mud from inundations.

C. Above this was another habitable area, 0.40 metre thick, with fireplaces, and containing many worked flints and bone carvings.

(x), Human skeleton lying on the rock-bed; A C E, Magdalénien debris; B D, Alluvial deposits.



FIG. 38.—Section of the Deposits in the Rock-shelter of Chancelade (Dordogne).
(After M. Hardy.)

D. The uppermost bed was alluvial mud, 0.55 metre thick, which also contained a habitable area, E, rich in relics.

S. Stalactites from the roof.

It was at the base of the A deposits (x), at a depth of 1.65 metres, that the skeleton lay in contact with the rock.

The skeleton is described (L. Testut, *Recherches Anthropologiques sur le squelette quaternaire de Chancelade*, 1889) as that of a man of about sixty years of age. It lay on the left side, the head leaning forward and the hands and knees strongly bent towards the face. The height of this man, as calculated from the length of the femur, was 1.50 metres. The skull (Fig. 37) was large, well proportioned and dolichocephalic; the forehead and chin were well developed and the superciliary

ridges not prominent. The right temporal region showed signs of an extensive cicatrised fracture, and besides, it had been slightly injured by a workman's tool, so that very precise measurements were not available; but upon the whole the Chancelade skull seems to have been quite up to that of the old man of Cro-Magnon in point of cranial development.

M. Hardy thought from the excessively bent-up position of the body that the flesh had been removed before burial; but if not, the body must have been ligatured to keep it in such a position. Also, in his desire to be absolutely correct, he states that the streaks of peroxide of iron above referred to were not limited to the region of the skeleton, but extended over the whole horizontal area of the station; at the same time the ochreous matter was in greater abundance near the body.

"J'ajouterais cependant que le peroxyde de fer était en plus grande abondance auprès du squelette, et qu'il n'est pas impossible que dans l'une des inondations dont la station de Chancelade gardait les traces, ce fer dilué par les eaux se soit trouvé réparti un peu partout." (*C.A.P.*, 1889, p. 403.)

Homo Mousteriensis Hauseri.

On the 16th September 1907, M. O. Hauser commenced excavations in the lower grotto of the well-known station of Le Moustier, in a spot which had not previously been disturbed. At first he found only enormous quantities of flint chips, with occasional specimens of Acheuléen types. On the 7th March 1908, his chief workman unearthed a few fragments of bones, and, thinking they might be human, immediately sent for M. Hauser. They turned out to belong to a human skeleton, which, for protection, was temporarily covered over with earth so as to give time to have the bones extracted in the presence of competent witnesses. After being seen by a number of distinguished professors and others (10th August 1908) the skeleton was ultimately taken out of its matrix in pieces under the care of Professor Klaatsch of Breslau, by whom the skull, as far as possible, was restored.

The body of this person is said by Dr. Klaatsch and the discoverer to have been buried intentionally, with sepulchral rites, beneath undisturbed strata of Moustérien age. The right

arm was folded under the cheek and the left extended. Near the left hand lay a pointed flint implement of the coup-de-poing type ($6\frac{3}{4}$ inches long), beautifully chipped on both sides; and a little further on a large scraper. Besides these implements there lay around the body no less than seventy-four flints more or less worked, the specific purpose of which was undetermined, and ten well-worked instruments of ordinary archæological types. The skeleton was that of a young man about 4 feet 10 inches in height, whose wisdom teeth had not yet been fully developed. The cranium (Fig. 39) is described as having the osteological characters of the Neanderthal and Spy skulls.



FIG. 39.—Skull of *Homo Mousteriensis Hauseri*, side and front views. (After M. Hauser.)

The face was strongly prognathic and there was no chin. Bones of various animals, some of them being described as partially calcined, were close to the body. (From articles by M. Hauser and Dr. Klaatsch in *L'Homme Préhistorique*, January 1909.)

Homo Aurignacensis Hauseri.

Combe - Capelle, situated near the ancient town of Montferrand-du-Périgord (Dordogne), is the site of the discovery of another Palæolithic skeleton by M. O. Hauser. While excavating in archæological ground of the Aurignacien Age on the 26th August 1909, he exposed the upper portion of a human skull in a deposit which had not been disturbed

by any previous excavators. The skull was not then removed, but was left *in situ* till the 12th September, when the discoverer secured the assistance of Professor Klaatsch, well known as an expert in human palæontology. In the course of removing the bones, numerous perforated marine shells were observed in the vicinity of the head and neck, which evidently had served as some kind of ornament. The skeleton was that of a male subject, but its osteological characters were not those peculiar to the Neanderthal-Spy race. A lofty skull



FIG. 40.—Front and side views of *Homo Aurignacensis Hauseri*. (After Hauser.)

and forehead at once indicated a higher type of humanity ; but it is not on this account of less importance. To this, apparently novel race in the Dordogne, Professor Klaatsch has given the name *Homo Aurignacensis Hauseri*. The skull was extremely dolichocephalic, the face slightly prognathic, and the chin little developed (Fig. 40). A peculiarity of the skeleton was the relative shortness of the limbs, the fore-arms and legs proper being no longer than the humerus and femur. The body was dumpy and the thorax voluminous, and both these as well as the limbs indicated powerful muscular action. It had been deposited in Moustérien débris, but the associated relics were characteristic of the Aurignacien Age,

and were grouped about the head and feet. The race to which this fossil man belonged would appear to have occupied an intermediate position between the Neanderthal-Spy and Chancelade races, recalling in some respects the man of Galley Hill in Kent. (*L'Homme Préhistorique*, 1909, p. 341.)

Human Skeleton of Chapelle-aux-Saints.

In the month of August 1908, while MM. les Abbés A. and J. Bouyssonie et Bardon were excavating the small grotto of Chapelle-aux-Saints (Corrèze), in the valley of the Sourdoire, a tributary of the Dordogne, they came upon an artificial



FIG. 41.—Side view of the Skull of Chapelle-aux-Saints, after being restored by M. Boule (*L'Anthropologie*).

hollow containing a human skeleton. The débris is described as purely Moustérien, and the skeleton lay under 12 to 16 inches of undisturbed archæological material. The grave measured 4 feet 8 inches in length, 3 feet 3 inches in breadth, and 1 foot in depth. The body was that of an aged man, about 5 feet 3 inches in height. It lay on the back with the head to the west, the legs bent upwards, the right hand flexed under the head, and the left extended. Around the body were bones of various animals broken for their marrow, together with a few flint weapons and bone pointers—supposed to have been the remains of a funeral feast.

The skull (Fig. 41), though slightly damaged by the

workmen while being extracted from the cave-earth, was nearly perfect, and presented the following characters:— Flattened top, retreating forehead, large projecting orbits and prominent superciliary arches (cephalic index 75). The lower jaw was thick and robust, and had a cut-away chin. The occipital foramen was unusually elongated, and placed more posteriorly than in modern races. M. Boule, to whom the bones were submitted for scientific examination, describes the man of Chapelle-aux-Saints as having a bestial aspect, and places him in point of cranial development half-way between *Pithecanthropus erectus* and the lowest of present-day savages. (*L'Anthropologie*, xix., p. 519.)

Fossil Men of La Ferrassie.

M. Peyrony, the learned teacher of Les Eyzies-de-Tayac, while excavating in the débris in front of the prehistoric shelter of La Ferrassie (Dordogne), in the month of October 1909, came upon a human skeleton at a depth of 4 metres from the surface. The body lay in an archæological stratum of the Moustérien epoch, containing flint implements and bones of the woolly rhinoceros, bison, horse, and a few of the reindeer. The superincumbent layers were undisturbed, and consisted, first of upper Moustérien deposits with worked flints and broken bones; next came beds rich in flint and bone implements characteristic of the Aurignacien period. The roof of the shelter had then fallen and covered these culture deposits with large blocks. Later, people took up their abode over the ruins, but habitation was altogether abandoned towards the end of the Magdalénien epoch, after which the shelter became concealed by washed-down materials. There was nothing to suggest that the locality had been disturbed till modern times, so that the skeleton must have been contemporary with the Moustérien deposits in which it lay. Before extracting the bones a group of savants was called together to examine the skeleton *in situ*, and to advise as to the best means of exhuming it. Among the visitors on that occasion were MM. Boule, Capitan, Cartailhac, Breuil, and the Abbés Bouyssonie and Bardon. The body lay on the back with both legs flexed towards the right side, the left arm stretched

at the side as far as the hip, the right arm raised and flexed, the head turned to the left shoulder and the jaws widely apart. Two large stones were on each side of the body and two or three others at the head. It does not appear that there had been a ritual burial, but it is to be noted that the bones were in their anatomical position, except the right foot and hand, which were missing.¹ The savants were unanimous in rejecting the idea of accidental death, as the attitude of the body was that of quiet repose, and there was no fall of rocks at the time. The cave being much frequented the body must have been in some way protected, otherwise it would have been eaten up by hyænas. It might have been lightly covered with soil or vegetable matter, but it was not buried in a grave like that at Chapelle-aux-Saints. The subsequent fall of rocks and gradual accumulation of a thick talus preserved the skeleton to the present day.

The anatomical characters of this skeleton agree with those of the Neanderthal-Spy race—dolichocephalic skull, retreating forehead, prominent superciliary ridges, great development of the upper jaw, chin almost sloping backwards, large ascending ramus of lower jaw, lower limbs short, bent and stout—leaving no doubt as to the race to which the Ferrassie man belonged.²

In the month of September 1910 another skeleton was discovered at Ferrassie, about 0.50 metre from the former, and in the same archæological stratum. An account of the circumstances, with a description of the remains, which point to an act of interment, is given by MM. Capitan and Peyrony (*Acad. des Inscriptions*, March 1911; and *Rev. Anthropologique*, April 1911). The skeleton, like the previous one, lay at the base of Moustérien débris, under undisturbed stratified deposits of *Aurignacien supérieur, moyen* and *inférieur*. It lay on the right side on an inhabited area, with the legs and arms flexed, and appeared to have been covered over with earth and other débris. The skull was crushed and only fragments of it

¹ M. Breuil states that some of the phalanges of the right hand had been found lying over the breast of the skeleton, as if they had been replaced after being removed by some accidental cause (*Les plus anciennes Races Humaines connues*, p. 37).

² See communications by Capitan and Peyrony, with illustrations, in *Rev. de l'Ecole d'Anth.*, 1909, p. 402; *Acad. des Inscriptions*, 19th Nov. 1909.

remained, but portions of the limbs were fairly well preserved. The body is supposed to be that of a female 1.48 metres (4 feet 10 inches) in height. The Ferrassie skeletons are considered of importance on account of the precise stratigraphy of the deposits, which leave no doubt as to their undisturbed condition.

Human Skeletons of Grenelle.

Human bones have been often recorded from the ancient gravels of the Seine. In 1867 M. Emile Martin gave a description of the gravel-pits at Grenelle and the position in which a number of human skeletons were found. Dr Pruner-Bey, to whom he showed the skulls, as well as some flint implements and animal bones associated with them, positively declared that he recognised the former as belonging to a Mongoloid race who inhabited Gaul before the Celts and the Kimri. (*C.A.P.*, 1867, p. 344.)

The alluvial deposits of Grenelle are composed of two distinct beds, called superior and inferior, in the latter of which the bones of *Elephas antiquus*, mammoth, woolly-haired rhinoceros, reindeer, etc., have been found generally at a depth of 7 to 8 metres. The upper bed, in which the human remains were found, consists of sandy layers almost sterile in relics of any kind. There is a consensus of opinion that the persons whose skeletons are here represented were victims of former inundations of the Seine. The position in which the bodies lay is little above the present level of the river. According to G. de Mortillet (*Le Préhistorique*, 3rd edition, p. 282), no naturalist, after careful consideration of the facts, would assign a greater antiquity to the Grenelle skeletons than the age of Robenhausen; and yet the skulls of these people have caused much learned discussion. M. Hamy describes one as belonging to the Cro-Magnon race (*Pal. Humaine*, p. 253); and in *Crania Ethnica* one of the Grenelle skulls is brachycephalic, with a cephalic index of 83.53.

Nothing better illustrates the importance of caution in accepting reports of excavations conducted by unskilled people than these Grenelle discoveries. The slender grounds on which some of the ablest anthropologists formulated their racial theories in those early days is astounding. M. de

Quatrefages, who had previously held that anteriority in point of development must be assigned to the brachycephalic races, thus writes of the Grenelle skeletons :—

“The old beds of the Seine, studied with remarkable intelligence by M. Belgrand, have furnished us with a relative chronometer, the indications of which have been fully appreciated by M. Hamy. The work presented by him at the Stockholm Congress (p. 772) leaves no room for doubt. Till the present time the dolichocephalic type only has been found in the lowest gravels of the plain of Grenelle. It is therefore represented by the Canstadt race. It reappears in the form of the Cro-Magnon race, in the alluvial beds at the level of and below the erratic blocks at a depth of 3 to 4 metres. Skulls which approach more or less to the brachycephalic type are only found above this level at a depth of from 2.50 metres to 1.40 metres. The superposition, and consequently the succession of types, is here evident. Does this authorise us to consider the dolichocephalic type as having everywhere preceded the brachycephalic? We ought perhaps still to retain some doubts on this point. Some fragments, belonging probably to the latter, have been discovered at Clichy, very little above a cranial vault of the Canstadt race, and the beautiful skull from Nagysap in Hungary was obtained from a well-characterised loess, the age of which, however, does not appear to have been determined.” (*Human Species*, p. 299.)

Clichy Skeleton.

In 1868 M. E. Bertrand notified, at the Anthropological Society of Paris, the finding of portions of a human skeleton in ancient gravels of the Seine at Clichy, at a depth of 5.45 metres. The human bones were enclosed in a confined space along with those of elephant, ox, horse, and stag. Those of the elephant were discoloured by a reddish substance, believed to have been derived from an upper stratum in which they were originally embedded; while the associated animals' bones were of a whitish colour, and represented individual bones of different species. M. de Mortillet maintains that the discoverer, on visiting the gravel quarry in the absence of the workmen, came upon a concealed hoard which one of the latter had laid aside till such time as a purchaser turned up. Of course, there was a controversy over the matter, but, as Cartailhac remarks, it ended by each controversialist holding his own opinion.

The skull, according to M. Hamy, was nearly complete, except the frontal portion, but sufficient remained to determine the cephalic index to be 67 or 68. Some distance higher up another skull was disinterred which belonged to the “groupe

mongoloïde" of M. Pruner-Bey. M. Hamy, in his notes on the *Crâne de Clichy*, makes the following remarks in regard to the mixed skulls of the Seine deposits :—

"On remarquera d'ailleurs que, dans les couches les plus profondes l'homme fossile dolichocéphale est encore seul, et ce n'est qu'un peu plus haut, et par conséquent plus tard, qu'il se juxtapose au brachycéphale." (Hamy, *Paléontologie Humaine*, p. 210.)

Race de la Truchère.

During the seasonal low water in the month of September 1868, a skull was extracted from the bed of the Saône, near the mouth of the Seille, at a place called La Truchère, which also caused quite a sensation among anthropologists. It appears that a quantity of dead trees, especially oaks, with their branches intertwined, lay in the bed of the river—said to be a forest-bed of geological remoteness—which the inhabitants of La Truchère were hauling out for industrial purposes. Lying under a trunk just extracted, the workmen observed an isolated human skull, which they extracted and threw on the bank. It was taken possession of by M. Legrand de Mercey, who showed it at the time to M. Pruner-Bey, and subsequently sent a cast of it to MM. Quatrefages et Hamy. The skull, which was in an excellent state of preservation, lay 60 centimetres below the ordinary level of the river, and contained yellowish clay similar to that which formed the river-bed. There were no animal bones nor any relics associated with it. On a report that remains of the mammoth had been discovered in other beds which had a similar colour to the clay of La Truchère, MM. Quatrefages et Hamy inserted it in their *Crania Ethnica*, as representing a new brachycephalic race of the Palæolithic period. M. Quatrefages, under the heading *Race de la Truchère*, thus describes it :—

"Cette race, plus ancienne que les précédentes puisqu'elle a été contemporaine du mammoth, n'est connue à l'état fossile que par un seul crâne trouvé dans une berge de la Seille, à la Truchère (Saône-et-Loire). Ce crâne est franchement brachycéphale (indice 84.32). Tandis qu'il se renfle sur les côtés, la face au contraire s'allonge et se rétrécit. C'est le contraire de ce que nous avons vu chez les hommes de Cro-Magnon. Le nez est très grand et très long, la mâchoire supérieure légèrement prognathe, les pommettes massive." (*Hommes Fossiles*, etc., p. 76.)

The Jaw of Malarnaud.

The cave of Malarnaud lies near the village of Montseron (Ariège), in face of the south side of the steep valley in which flows the Arize. The entrance, which is described by M. Henri Filhol (*Bull. de la Soc. Philomath. de Paris*, 1889) as 35 to 40 metres above the stream, is large, and opens into a spacious gallery which, after extending for 15 metres bifurcates, each branch leading into a gallery. That on the left slopes downwards into the mountain for some 60 metres, at the end of which there is an abrupt fall of 12 metres, necessitating the use of a ladder for a descent. At the bottom are two galleries, one right and one left. It was in a small chamber opening from the former that the jaw in question was found in the year 1889. It lay 2 metres beneath a layer of stalagmite, in the middle of an enormous quantity of bones of rhinoceros, cave-bear, cave-lion, panther, wolf, etc., in a matrix of fine reddish clay. The alveolar canal and the sockets of the teeth were filled with the cave-earth, which proves that it was imported along with the latter material. The jaw is minus the teeth except the first right molar, but otherwise it is almost entire. The third molars or wisdom teeth were still within their sockets. It has a thick, low body, but no chin, and bears a striking resemblance to the Naulette and Spy jaws already described. The lower edge is such that when placed on a table it touches it along nearly its whole extent. There is only one pair of incisors, which, however, may be an anomaly, as this peculiarity occurs occasionally in modern jaws. Fig. 19 shows the outlines of this jaw, and as a contrast, I have placed beside it the outline of the famous Moulin-Quignon jaw, which was said to have been found in the lower Quaternary gravels at Abbeville, but is now generally admitted to have been put into the pits by the workmen. (*C.A.P.*, 1889, p. 417.)

Skulls of Marcilly-sur-Eure and Bréchamps.

In 1883 a human skull was found in a railway cutting at Marcilly-sur-Eure, between Dreux and Évreux (Eure), at a depth of 7 metres from the surface, in brick-clay deposits, which

surmounted the marne of the district at a height of some 30 or 40 metres above the level of the river Eure. The skull was broken by the workmen at the time of the discovery, and only the anterior portion of it was saved by M. Doré-Delente, who sent it to G. de Mortillet with descriptive details of the circumstances under which it had been disinterred. From Mortillet's description (*L'Homme*, 1884, p. 48), the skull had prominent superciliary ridges and a low, retreating forehead. Although the frontal prominences were distinctly marked, and its general simian characters less pronounced than those of the Neanderthal skull, M. Mortillet accepted it as belonging to that race. No worked objects were detected in association with the skull, but in other parts of the brick-clays flint implements characteristic of the Acheuléen or Moustérien epoch had been found. Mortillet pronounces it to be, if not the most characteristic, certainly one of the best dated specimens of *l'Homme Moustérien*.

In 1892 M. Doré-Delente came into possession of another skull of the same Neanderthaloid type as that of Marcilly-sur-Eure, which was discovered in a similar brick-clay deposit at Beaudeval, Commune of Bréchamps (Eure-et-Loire). It was less damaged than the former, and in the hands of M. Manouvrier it yielded the following dimensions:—

| | | | | | |
|------------------|---|---|---|----------|-----------|
| Antero-posterior | . | . | . | diameter | 188 mm. |
| Transverse | . | . | . | " | 142 " |
| Cephalic index | . | . | . | . | 75.5 " |
| Capacity | . | . | . | . | 1400 c.c. |

The skull was associated with other bones of the skeleton, but on being laid aside for further examination, they were, through a mistake of one of the workmen, reburied in the débris and lost.

Manouvrier describes this skull as essentially belonging to the Neanderthal-Spy race. It showed a retreating forehead, a flattened calvaria, but a marked attenuation of the projecting upper border of the orbits. The less pronounced Neanderthaloid characters of both the Bréchamps and Marcilly-sur-Eure skulls he attributed to the fact that the men they represented were smaller and less powerful than the Neanderthal-Spy folk. Their morphological characters being in accordance

with the geological and palæontological conditions under which they were found (which were proved to be of the Moustérien epoch), Manouvrier thought they should be accepted as representatives of the race which inhabited the north of France during the Moustérien epoch. (*R.E.A.*, 1897, p. 305.)

The Cave of Duruthy.

The cave of Duruthy, at Sorde (Landes), explored during the winter of 1872-3 and described by MM. Lartet and Chaplain-Duparc (*Une sépulture des anciens troglodytes des Pyrénées*, 1874; *Matériaux, etc.*, 1874, p. 101), is of singular importance in having contained both a Palæolithic skeleton and

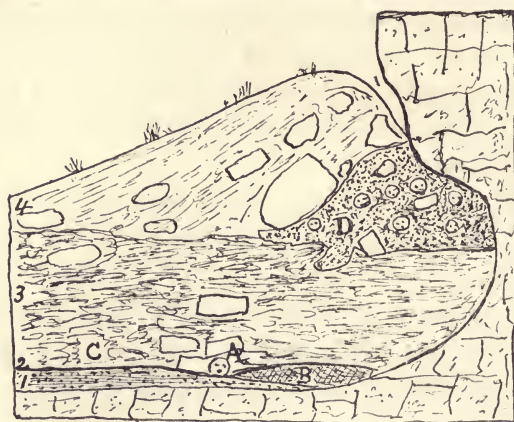


FIG. 42.—Section of Duruthy Cave, showing position of Palæolithic skeleton (A) and Neolithic burials (D).

a subsequent sepulchre of the Neolithic period. The cave, or rather rock-shelter, is situated in a rocky prominence overlooking the junction of two tributaries of the Adour. It measured only 2 metres in depth, and 8 or 9 metres in breadth. The accompanying section (Fig. 42) shows the following succession of archæological deposits found in it. On the rocky floor was a layer of red earth (No. 1), overlying which was a thin band of the débris of habitation black with charcoal (No. 2), in which was found a human skeleton so much crushed with fallen blocks that no precise measurements of the skull could be taken, even after its restoration. It was, however, clearly dolichocephalic, and in all respects similar to the skulls of Laugerie Basse and Chancelade. As the body had only been partly protected by

the fallen rocks, most of the trunk and long bones were broken and dispersed, being probably eaten by wild animals. Near it were collected various flint implements and some fifty pierced canine teeth, three of lion and the rest of bear, which evidently had been strung together to form a necklace. Immediately above this was a thin layer of land shells, showing that the shelter had been for some time uninhabited. Above this was an accumulation of refuse 2.70 metres in depth (No. 3), containing broken bones (reindeer, oxen, horses, and stag), ashes, and worked objects of flint and bone—among the latter being a harpoon with a double row of barbs, like those from La Madeleine. No. 4 consists of a thick talus, which covered the opening into the rock-shelter. This latter was also protected by a barrier of the fallen rocks, and behind it was a sepulchral vault enclosing upwards of thirty skeletons. From the character of the grave-goods associated with the bones—pointers of bone, some beautifully chipped lance-heads of flint, and fragments of pottery—this burial was regarded as belonging to the Neolithic period. We have thus positive proof that Neolithic people were in the habit of constructing ossuaries in caves formerly occupied by Palæolithic men, hence the difficulty of determining to which race the remains belonged—a difficulty which has frequently occurred, as at Solutré, Aurignac, Trou du Frontal, and the caves of Grimaldi.

The necklace, which belonged to the crushed man, was a real work of art, most of the teeth having been adorned by various devices—one had the figure of a seal (Pl. IX., No. 12), another that of a pike, and a third a form which looks like a glove for the forearm.

Human Jaws of Petit-Puymoyen.

In 1906 M. A. Favraud discovered, in face of a rugged escarpment of rock overlooking the beautiful valley of Eaux Claires, in the Commune of Puymoyen (Charente), an inhabited site of the upper Moustérien epoch known under the name of Petit-Puymoyen, in which fragments of three human jaws were found. The fauna associated with the station included the reindeer (some twelve individuals), horse (6), ox (5), wolf (2), hyæna (one premolar tooth), dog and fox (each one canine

tooth), together with a few other species. The worked implements of ordinary stone were in considerable abundance, and consisted of hammers and throwing-missiles, the former being quartz pebbles, while the latter were roughly rounded from limestone rock. The flint industry was represented by nuclei, knives, scrapers, borers, and discs worked on both sides. Of bone and horn there were cut portions, supposed to have been used as anvils, while others were utilised as implements of some kind, and others were perforated with a round hole.

The deposits formed an upper and a lower stratum. The

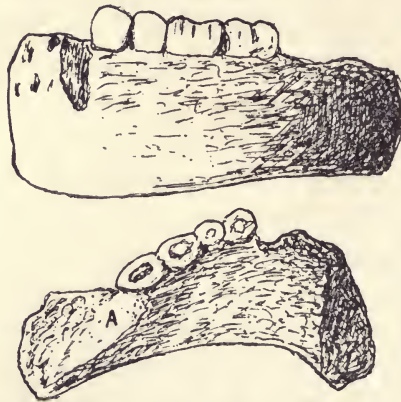


FIG. 43.—Portion of Human Mandible from the Station of Petit-Puymoyen.
"A" indicates the position of the wisdom-tooth, still in its socket. (After Favraud.)

latter consisted of a consolidated breccia of reindeer bones, worked flints, etc., and in it were found all the fragments of human jaws, but not in the same place. In the same stratum were also the larger and older flint implements, such as the oval coup-de-poing types. The upper was characterised by the preponderance of reindeer remains and industrial objects of bone and horn, said to belong to the Aurignacien epoch.

The upper fragment of a human jaw discovered at once showed that, in point of the straight chin and massiveness of structure, it could be paralleled with that of Naulette. According to Professors Siffre and Gaudry, to whom the fragment had been submitted, it belonged to a young subject from fourteen to eighteen years of age. The first and second molars were in their sockets, but the third or wisdom tooth had not yet emerged from the alveolar border (see A in Fig. 43). A

portion of a second mandible showed the canine and first pre-molars to be larger than their homologues in modern jaws—characters which recall the form of the corresponding teeth of the anthropoids. The age of the person who owned this large jaw was estimated to be about twenty-five years. The third fragment, which came from an upper jaw, still retained three large molars in their sockets, and was judged to have belonged to a young person of about sixteen years of age. The discovery of these mutilated fragments of human jaws belonging to three young people among the food-refuse and débris around the hearths suggests that the Palæolithic inhabitants of the station of Petit-Puymoyen were cannibals. M. Favraud describes the industrial remains found on this station (*Rev. de l'Ecole d'Anth.*, 1908, pp. 46-72) with ample illustrations of the flint and bone objects. The former are well finished, and the latter supply further evidence that bone and horn were utilised as early as the Moustérien epoch.

The Skull of Placard.

The cave of Placard (Charente) is situated on the left bank of the Tardoire, opposite Rochebertier. It presents a clear opening, some 3 metres in diameter, and extends into the interior about 35 metres. The archæological and disintegrated materials accumulated in the cave to a depth of 9 or 10 metres. The former consisted of eight beds, intercalated between as many sterile deposits, composed of fallen rocks, mud, stalagmite, etc. The highest stratum contained Neolithic relics. The next four archæological strata were Magdalénien débris containing hearths and characteristic industrial remains, while the lower three belonged to the Solutréen, Aurignacien, and Moustérien epochs.

Excavations have been made by various parties at different times, notably by M. de Maret (1877-1888). The result of the excavations was to bring to light a variety and wealth of relics of Palæolithic times unequalled by any other station. A general description of its industrial remains is given by A. de Mortillet in a paper to the *Association Française pour l'Avancement des Sciences*. (*Comptes rendus*, pp. 631-642; see also *Musée Pré-historique*, pl. xxix.)

The station is also interesting on account of the stratigraphical position of the débris representing the different archæological epochs, which succeed each other without a break in continuity. Among the Solutrén deposits some human remains (fragments of skulls, etc.) have been noted, but they were too mutilated to be of any scientific value. On the 24th March 1881, M. Maret exhumed from a blackish deposit, interspersed with hearths, the remains of a female skeleton, of which the skull was almost perfect. According to Hervé (*R.E.A.*, 1893, p. 178), the stratigraphical position of the bed in which the skull lay did not allow of any doubt as to its being contemporary with the hearths. Moreover, its associated relics—implements of flint in all their varied forms, *bâtons de commandement*, darts, barbed harpoons, needles, whistles, etc.—fixed precisely the epoch as Magdalénien. In



FIG. 44.—Skull of a Skeleton found by M. Julien in the Barma Grande Cave.



FIG. 45.—Brachycephalic Skull from Placard. (After Maret.)

comparing the skull (Fig. 45) with others of the period, it presented a remarkable difference, viz., the comparative shortness of antero-posterior diameter, which measured only 175 millimetres, whereas the transverse amounted to 140 millimetres (a cephalic index of 80)—thus apparently contradicting the generally accepted opinion that Palæolithic skulls were dolichocephalic. M. Hervé, however, contends that, notwithstanding the high cephalic index, the Placard skull was no exception to the above rule, as it possessed all the other features of dolichocephalic skulls of the Magdalénien epoch. M. Hamy (*C.A.P.*, 1889, p. 437) holds much the same opinion as Hervé, adding that sex partly accounted for the shortness

of the antero-posterior diameter and other deviations from the Cro-Magnon type. For comparison I have placed beside the outline of the Placard skull that of one of the Cro-Magnon race found by M. Julien in the cave of Barma Grande, near Mentone (Fig. 44). On the other hand, G. de Mortillet held that the skull of Placard was that of a Neolithic interment:—"Il était dans un milieu Magdalénien, mais seulement à 70 centimètres au-dessous de l'assise robenhausienne, dans une vallée où les sépultures néolithiques dans les grottes sont assez fréquentes" (*Le Préhistorique*, 3rd edition, p. 315).

Skeleton of Hoteaux.

The rock-shelter of Hoteaux, near Rossillon (Ain), consists of a terrace, open to the south, but protected by an overhanging cliff and the projection of rocks on each side. The shelter measured 15 metres in length and from 8 to 10 metres in breadth. A small dark grotto opened on the terrace. The station was discovered and excavated by MM. A. Tournier and Charles Guillon, in 1894, and the results were published in the following year, under the title of *Les Hommes Préhistoriques dans l'Ain*, 1895.

The total depth of the deposits was 2.35 metres, divided into six archæological strata of a blackish colour, and intercalated by a similar number of yellow fluviatile and detrital beds which were destitute of industrial remains. Judging from the character of the relics the former were assigned to the Magdalénien epoch. The most characteristic object found in the débris was a *bâton de commandement* adorned with the engraved figure of a reindeer. The remains of this animal were abundant, but in the upper layers they were being replaced by those of the red-deer. A human skeleton was uncovered in the sixth archæological stratum at a depth of from 1.90 to 2 metres, and it was particularly noted that the superincumbent layers were unbroken. The body lay on the back across the terrace with the feet pointing outwards, and it was covered by red ochre. The two femurs were displaced from their anatomical position—a fact which suggested that the flesh had been removed before interment. The antero-posterior diameter of the skull was 181 millimetres,

and the transverse 140 millimetres. The discoverers maintained that this was a Palæolithic burial contemporary with the strata in which it lay. As such it was brought before the Anthropological Society of Paris in 1896 by M. E. d'Acy, where it gave rise to a long and animated discussion. G. de Mortillet strongly disagreed with this opinion, holding that it was a Neolithic burial (*Le Préhistorique*, 3rd edition, p. 314).

The Skeleton of Moustier-de-Peyzac.

The announcement of the discovery of a female skeleton in the rock-shelter of Moustier-de-Peyzac was first made by M. Emile Rivière on 1st October 1905, at the Périgueux Meeting of the Prehistoric Congress of France, then held in that town, but few details were given. Subsequently, at a meeting of the same Congress at Chambéry (1908, p. 123), he discussed the subject at some length. The portion of ground in which the skeleton was found lies in front of the overhanging rock, and measures about 100 square metres. The ground was partly built upon, and it was in the course of further building operations that the skeleton was exposed (29th August 1896). On being informed of the discovery, M. Rivière visited the locality on 3rd September, but by this time the skeleton had been removed from its original place owing to the exigencies of the works then in progress. In the process of extraction the lower portion of the face became detached from the cranium and had some of the ashes and cinders of the hearth over which it lay still adhering to it.

The body is described as lying on the back, the limbs extended and the mouth wide open, at a depth of 0.55 metre from the surface, in Moustérien débris which M. Rivière positively asserts had not been previously disturbed. The skeleton was nearly entire, and, judging from the length of the femur (0.36 metre), the height of the woman was estimated at 1.60 metres (5 feet 2½ inches). From a photograph, the skull, which was still in its original matrix, was well developed and evidently brachycephalic. Nearly all the teeth were in their sockets, and the chin is especially prominent. In the immediate vicinity of the body, bones of *Bos primigenius* and reindeer, flint implements of Moustérien types, and a small Chelléen

coup-de-poing were collected. Nothing that could be called an ornament, or amulet, was found associated with the body—no perforated shells or teeth, no worked objects of bone or horn, nor any colouring matter. M. Rivière stoutly maintains that the skeleton is that of a woman of the Epoque Chelleo-Moustérienne. The position of *Homo Mousteriensis Hauseri* was only 6 metres from that now described by M. Rivière, and it is but natural to ask why it had not been described earlier. At the Tours meeting of the same Congress (1910, p. 116) he discourses on the lower jaw, of which an excellent photograph is published, as well as one of the skull. Dr Manouvrier, to whom the bones had been submitted for anatomical investigation, characterises the skull as “type absolument moderne, c'est à dire des temps néolithiques les plus reculés jusqu'à nos jours” (*ibid.*, p. 118).

It is hardly necessary to say that French anthropologists are not unanimous in accepting M. Rivière's opinion as to the age of this skeleton. In exhibiting the skull, still in its original matrix, at the Société Préhistorique de France, 3rd March 1909, M. Rivière thus refers to “la campagne systématiquement hostile à son antiquité entreprise depuis plusieurs mois.”

“En présence des allégations de M. Marcelin Boule, professeur de Paléontologie au Muséum d'Histoire Naturelle de Paris, me déclarant à moi-même, le 4 décembre dernier (1908), avoir des tuyaux—c'est l'expression dont il s'est servi—de prétendus témoins de la découverte du susdit auxquels j'ai donné aussitôt, sans la moindre hésitation, et je donne de nouveau ici un formal démenti,” etc.

*Human Remains of Minor Importance at Bruniquel
and other Stations.*

(a) The cavern of Bruniquel (Tarn-et-Garonne) is situated in a cliff 40 feet above the Aveyron. It was explored in 1863-4 by the Vicomte de Lastic, and described by Professor Owen in the *Philosophical Transactions* (vol. 159, p. 517). The floor was covered with a sheet of stalagmite, under which lay a bed of breccia 4 to 5 feet thick, composed of earth, fallen stones, charcoal, Palæolithic implements of bone and flint,

together with the osseous remains of many animals—rhinoceros, reindeer, Irish elk, bison, horse, etc. Portions of reindeer-horn were engraved with the forms of animals in the usual Magdalénien style. Embedded in this breccia, from 3 to 5 feet in depth, were human bones representing several individuals, including those of a child. They were very much decayed, and only one calvaria was so complete as to yield any measurements—and it was dolichocephalic. One of the skeletons was disinterred by the Vicomte de Lastic and Professor Owen with sufficient care to prove that it had been deposited in a crouching position. Owen believed that these skeletons were of the same age as the mammals and implements with which they were associated. But this opinion has not been universally accepted. (See *Cave Hunting*, p. 248.)

(b) Two human skulls found in the cave of Lombrive (Ariège) by MM. Garigou, Filhol, and Rames, associated with remains of the reindeer, and for that reason supposed to be Palæolithic, are regarded by Professor Boyd Dawkins as Neolithic. As the reindeer lived in Scotland up to historical times, he argues that the presence of the animal could not be a sufficient reason for assigning two brachycephalic skulls to the Palæolithic period. Besides, the other associated fauna—*Bos longifrons*, urus, stag, small ox, horse, dog, and brown-bear—were equally characteristic of the Neolithic period. (*Ibid.*, p. 256.)

(c) Portion of a human mandible was found by Ed. Lartet at the well-known station of Les Eyzies; another, that of an upper jaw, was found by Cartailhac at La Madeleine. (*R.E.A.*, 1893, p. 173.)

(d) The skeleton discovered by Lartet and Christy in 1864 among ossiferous débris in the rock-shelter of La Madeleine, and now preserved in the Natural History Museum, was not considered to belong to the Palæolithic period, although the bones presented the general characters, but in a minor degree, of those of Cro-Magnon. (*Bull. Soc. d'Anthrop.*, 1874, p. 599.)

(e) A number of fragmentary human remains from various caves are described by M. Hamy under the heading "Nouveaux matériaux pour servir à l'étude de la Paléontologie Humaine" (*C.A.P.*, 1889, pp. 405-450). Among the sites from which he

draws his materials are the caves of Gourdan (Haute-Garonne), Fées à Marcamps (Gironde), Aurensan (Hautes-Pyrénées), les Forges (Tarn-et-Garonne), les Eyzies (Dordogne), Mas-d'Azil, etc.

(f) Notice of a human mandible found by MM. Roule et Reignault in the Grotte d'Estalas (Ariège), was read at the Académie des Sciences on the 22nd July 1895. It was found in a bed of clay, beneath stalagmite, and supposed to be that of a child of about ten years of age. Among the associated fauna were the cave-bear, horse, stag, ox, and brown bear (*Ursus arctos*). From these data no legitimate inference as to the period in which the owner of this jaw lived could be drawn, more especially as it disclosed no distinct Palæolithic characters. The chin was well-formed and projecting forward like ordinary mandibles.

(g) The circumstances in which MM. Girod et Gautier discovered human bones in volcanic scorix at the foot of Mount Gravenoire are too indefinite to be discussed here (*R.E.A.*, 1892, p. 269).

The Skeleton of La Quina.

On the 16th October 1911, Dr Henri Martin sent a note to the Académie des Sciences in Paris announcing the discovery of a human skeleton of the Neanderthal type, on the 18th September last, in the station of La Quina (Charente). The skeleton lay in a horizontal position, in an ancient muddy deposit of the river Voultron, forming part of the lower Moustérien débris, and at a distance of 4.50 metres from the base of the present cliff. The stratum in which the skeleton was embedded consisted of sandy clay, underlying a mass of fallen rocks from the cliff which in Moustérien times projected over the bank of the river. (See Fig. 47.) The skeleton was buried in its muddy bed to the extent of 0.80 metre, but it was not surrounded by a grave, nor was there any appearance of its having been intentionally inhumed. On the contrary, the situation and circumstances indicated that the body had either fallen from the cliff, or was carried by the current of the stream into the place where it was found, and so became permanently entombed in the sedimentary débris of the



Profile of the Skull of the Skeleton of La Quina. (After a photo by Dr Henri Martin.)

Neanderthal-Spy race of Europe, until the skeleton is completely disinterred from its matrix and carefully examined.

Dr Martin described the skeleton and its position in the La Quina station, together with the ingenious method by which he transported a solid mass measuring $43 \times 25 \times 23$ inches, containing the human bones, into his laboratory, at a meeting of the Société Préhistorique Française, on 26th October 1911. This communication was accompanied by photographic illustrations, one of which, showing the skull while only partially cleared of the surrounding earth, I am enabled, with the author's kind permission, to print as Plate XIV.

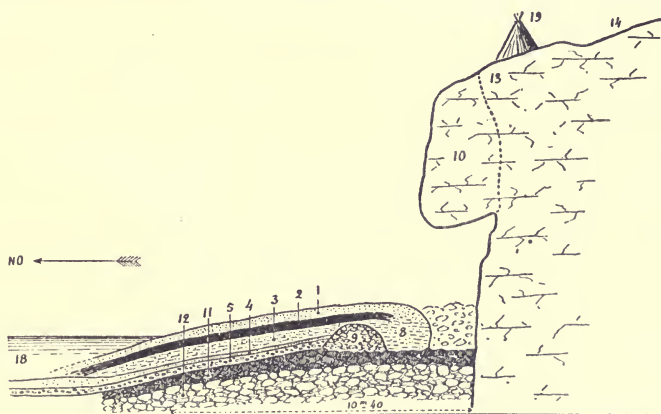


FIG. 47.—An idea of the site of La Quina during the Mousterien epoch.

The station of La Quina is well known to anthropologists, having been described by its discoverer, M. Chauvet, as early as 1896 (*Bull. Soc. Arch. de la Charente*), and by others since. But Dr Martin's labours in the excavation of La Quina, even before the present very important discovery, had the foremost place, as shown by his valuable work, *Evolution du Mousterien dans la Station de la Quina*, published in 1907. Previous to this, Dr Martin discovered that certain large bones, found in the Mousterien deposits of La Quina, had been utilised as implements (*Soc. Préhist. Française*, 1906, pp. 155, 189). In the following year he published sections of the station showing the true stratigraphical position of its successive archaeological strata. A careful study of these sections will give more precise information as to the position of the skeleton

than any amount of writing. I therefore reproduce them here with a few explanatory annotations.

Fig. 46 shows the site of the station before excavations were begun.

Fig. 47 gives an idea of what it was like during the Moustérien epoch.

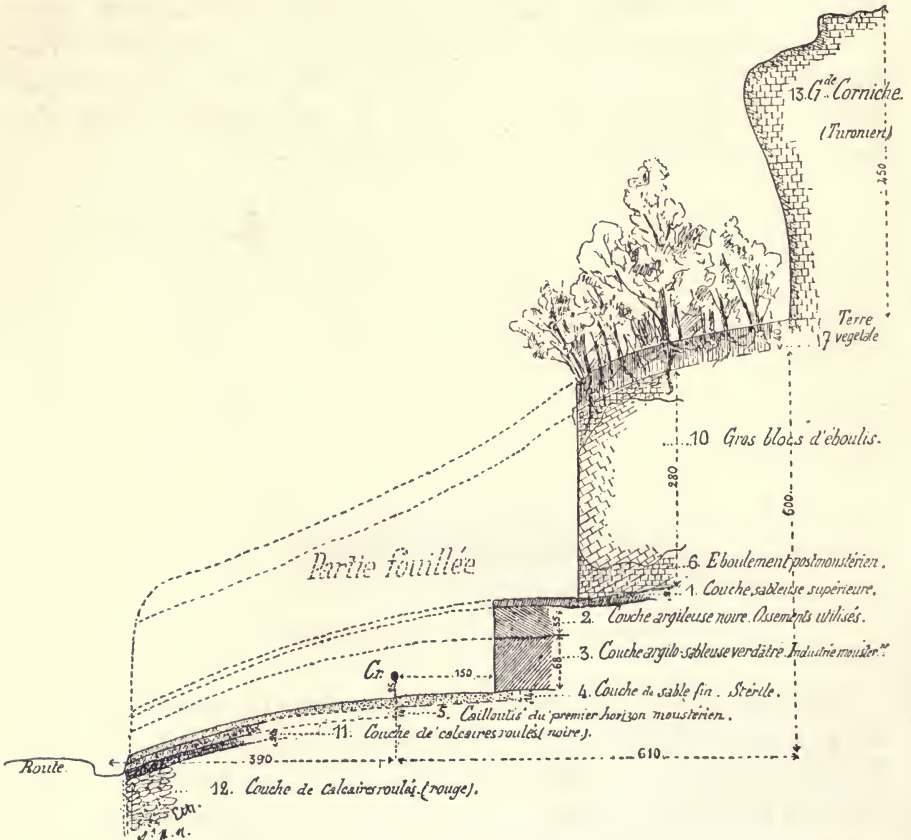


FIG. 48.—Cr. indicates the spot where the Skeleton was found. (Figs. 46, 47, and 48 after Dr Henri Martin.)

Fig. 48 indicates the spot where the skeleton lay.

CHAPTER VIII

FOSSIL MAN (ITALY AND OTHER COUNTRIES)

The Caves of Grimaldi. Olmo Skull. Eguisheim Skull. Brûx Skeleton. Brünn Skeleton. Cemetery of Predmost. Skull of Podbaba. Skull from Fürst Johanns Höle. Sipka Jaw. Human Remains at Krapina. Homo Heidelbergensis. Gibraltar Skull. Pleistocene Man in Jersey.

The Caves of Grimaldi.

THE famous caves of Grimaldi are situated a little to the east of the town of Mentone, on the Italian side of the frontier, in a massive escarpment of Jurassic limestone, known locally as *Baoussé-Roussé*, or Balzi Rossi (red rocks). Here the rocks protrude on the Mediterranean, with an abrupt front, presenting at irregular intervals a series of wide fissures or rock-shelters. They are all nearly on the same level, viz., 27 metres above the sea, from which they are separated by a shelving plateau 15 to 35 metres in breadth. The construction of the railway from Nice to Ventimiglia in 1870 entailed a deep cutting through a portion of the talus in front of some of the caves, which brought to light hearths and other evidences of human habitation. These discoveries fortunately attracted the attention of archæologists and led to a long series of investigations, the results of which it is now my duty to describe as briefly as possible.

According to M. Boule (*C.A.P.*, 1906, p. 58) the number of caves hitherto more or less explored are nine, which, counting from west to east, are thus numbered and named:—

No. 1. *Grotte des Enfants*.—So called from the discovery of the skeletons of two children in it by M. Emile Rivière in 1874-5.

No. 2. *Abri Lorenzi*.—So named after the curator of the Anthropological Museum of Monaco.

- No. 3. *Grotte de Florestan*.—So named after Prince Florestan, who made some excavations here in 1845.
- No. 4. *Grotte du Cavillon*.—Here M. Rivière found the famous human skeleton known as *l'Homme de Menton*, now exhibited in the Natural History Museum in Paris.
- No. 5. *La Barma Grande*.—This cave, now partly destroyed, contained several human skeletons and a large number of manufactured objects.
- No. 6. *La Grotte du Baouso da Torre*.—Was entirely emptied by Rivière, and is now completely destroyed by quarrying.
- No. 7. *La Grotte du Prince*.—So named as being the property of Prince Albert I. of Monaco.
- Nos. 8 and 9.—These stations were simply shelters without importance.

Although the Grimaldi caves were for a long time objects of curiosity and had been subjected to some superficial excavations, the researches undertaken by M. Rivière (1870-5) were the first which yielded results of scientific value. He published an account of his discoveries and conclusions in a large volume, entitled *De l'Antiquité de l'Homme dans les Alpes-Maritimes* (Paris, 1878-88). The chronological uncertainties raised by M. Rivière's opinions led to the idea that the excavations had not been so carefully and scientifically conducted as could be desired. In these circumstances Prince Albert I. of Monaco ordered further systematic excavations to be undertaken, with the view of solving the date of the interments found in the caves, which M. Rivière regarded as Palæolithic.

The proposed excavations were begun in 1895, under the care of M. le Chanoine de Villeneuve, assisted by M. Lorenzi. They commenced operations in the *Grotte du Prince*, and continued the work for some time, with most interesting results from the stratigraphical and palæontological points of view; but as there were no skeletons met with, the operations were transferred, first to the *Grotte des Enfants*, and afterwards to the *Grotte du Cavillon* (No. 4), which still contained some undisturbed deposits—both of which yielded fresh discoveries of the highest importance. At the thirteenth meeting of the



Human Skeleton found in the Grotte du Cavillon (IV. Cave), known as "l'Homme de Menton." (Photo by Rivière.)

Congress of Anthropology and Prehistoric Archæology the results were discussed by some of the ablest scientists of the day—the proceedings of which, therefore, contain the latest opinions held on the subject.¹

M. Rivière's Researches.—The first skeleton found by Rivière (1872) was in the fourth cave, at a depth of 6.55 metres and about 7 metres from the entrance (Pl. XV.).² It lay on the left side, near the right wall of the cave, apparently in the attitude of sleep, the forearms turned upwards—the left being under the cheek—and the legs slightly bent. The head was a little more elevated than the rest of the body, and both it and the spine were close to some stones which appeared to have been a support to the back. Around the head were some two hundred shells from the Mediterranean (*Nassa neritea*), and twenty-two canine teeth of stags—all artificially perforated. Similar shells lay at the left knee, and were supposed to be part of a garter. Near the forehead was a well-formed pointer, or dagger, made from the radius of a deer; and under the occiput lay two broken flint knives. A thick layer of peroxide of iron covered the skull and the objects near it. In the earth beneath the body M. Rivière observed portions of the hide and hair of an animal in which he supposed the body had been wrapped, or which had formed the man's outer garment. The soil, both above and below the skeleton, contained bones of *Rhinoceros tichorhinus*, cave-bear, and cave-lion; and scattered through it were a few shells of non-Mediterranean species, such as *Purpura lapillus* and *Littorina littorea*. The skeleton was that of a tall man some 6 feet in height, with a dolichocephalic head and other characteristics of the Cro-Magnon race.

Later (1874-5), M. Rivière unearthed two skeletons of children from four to six years of age, in the Grotte des Enfants, at a depth of 2.70 metres and 10 metres from the entrance. The bodies lay close together in the extended position, with the feet outwards. Over one of them were about 1000 perforated shells (*Nassa neritea*) which had been strung together,

¹ See *Les Grottes de Grimaldi*, a magnificent monograph now being published under the auspices of Prince Albert I. of Monaco.

² The photo from which this illustration is taken was purchased in Mentone by Miss Crum, who happened to be residing there at the time of the discovery.

or sewn on a garment. No colouring matter and no grave-goods of any sort were along with these interments.

The sixth cavern measured 16 metres in breadth and 12 metres in depth, and, being close to the sea, was only 16 metres above its level. Blocks from the roof, successive hearths, shells, etc., were intermingled together, and among this heterogeneous débris three skeletons were discovered. The first lay on its back on a hearth, with the feet towards the back of the cave, and at a depth of 3.75 metres. Some of the bones were wanting, and of those that remained some were not in their anatomical position. The femur appeared to have been gnawed by a wild animal. Numerous perforated shells, one canine tooth of a deer, a flint knife and a flint pebble, lay about the upper part of the body—all of which had been covered with peroxide of iron. Its height was estimated to be about 2 metres. (J. Déchelette, *Archéologie Préhistorique*, vol. i., p. 298.)

A little lower, and to the right of the former, a second skeleton was met with, lying on uneven soil. Over the head was quite a network of perforated shells of various species, and teeth, all of which were coloured with peroxide of iron. A little higher up was a third skeleton, apparently that of a young person of about fifteen years of age. The body lay stretched out, back upwards, with no ornaments or objects of any kind near it.

The conclusions of M. Rivière may be thus briefly stated—all the deposits belonged to the Palæolithic period—the Moustérien below and the Solutréen above. The skeletons were true burials contemporary with the strata in which they were found. The dead, wearing their apparel and ornaments, were buried wrapped in skins, with their weapons beside them. No attention was paid to orientation, and the body was sometimes left in the position it occupied at death. A layer of ferruginous powder was strewn over the remains, except in the case of children, who appear to have been buried without the rites observed in the case of adults. The early cave-men used stones in the manufacture of implements before they discovered suitable flint deposits, and among their contemporary fauna were a species of elephant, the woolly-haired rhinoceros, hyæna, cave-lion, and cave-bear.

Other Investigations.

In 1884 M. L. Julien, foreman of the men employed in quarrying the cliff, made excavations in the Barma Grande (fifth cave), and discovered a skeleton at a depth of 8.40 metres. It lay on its back, with the head to the south, between a fallen rock and the left wall of the cave. Three large flint flakes were associated with this interment, one near the head and the other two between the shoulders. Above it was a layer of ashes containing the teeth of ruminants. A thick layer of "terre rouge" covered the head "comme une espece de bonnet." The skull (Fig. 44) was broken into a number of pieces, which on being put together disclosed the characters of the Cro-Magnon race—viz., a dolichocephalic head and a lofty forehead over somewhat prominent superciliary ridges. (*L'Homme*, 1884, p. 187.)

In 1892 M. Abbo, the proprietor of the cave, began to remove some of the débris for his garden, and in the course of these operations one of his sons came upon a human skull, and near it the rest of the skeleton. Two other skeletons were discovered later on, and the three, which lay parallel to each other, were left almost *in situ* till M. Verneau came on the scene a fortnight later (22nd February) and took charge of extracting the bones from their matrix. M. Verneau observed that the bodies had been placed in a specially prepared trench which had been overspread with a layer of ochre. The skeletons, two males and a female, lay close together across the floor of the cave, with the feet to the west. One, that of an old tall man, was outermost and lay nearly on the back, with the left hand stretched on the thigh, near which lay a magnificent flint knife 9 inches in length. About the head were various kinds of ornaments of teeth and bone, fish vertebræ, and perforated shells of *Nassa neritea*; and on each thigh bone above the knee was a perforated *Cypræa*. Next to this body was that of the female, lying on the left side, and having the right hand almost touching the shoulder of the former. Another long flint knife is said to have been found near the woman's hand, but otherwise there were fewer ornaments associated with this skeleton. The third body,

that of a youth, was turned towards that of the female, having the right hand stretched to her shoulder, and near it a third flint knife is said to have been discovered. Among the ornaments associated with this group were a number of "curious objects like double eggs or acorns connected by a common stem" (Fig. 49). Sir Arthur Evans discussed their comparative bearing with his usual critical and instructive acumen in an article entitled, "On the Prehistoric Interments of the Balzi

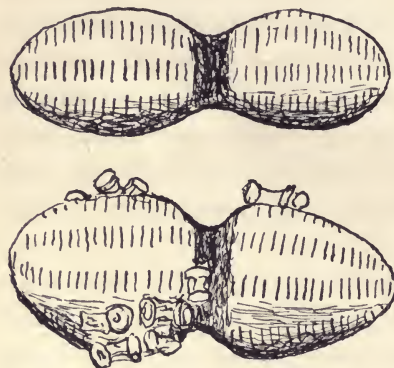


FIG. 49.—Curious Ornaments found in one of the sepulchral caves of Mentone (†).
(After Sir A. Evans.)

Rossi Caves, near Mentone, and their relation to the Neolithic Cave-Burials of the Finalese." (*Journal of the Anth. Inst.*, 1893, vol. xxii., p. 287.)

M. Verneau also gives a minute description of the respective ornaments worn by these personages. On the head of the old man was a coiffure composed of the perforated canine teeth of deer ornamented with cross lines, fish vertebræ pierced along their axis, and shells of *Nassa neritea*.

On the level of the thorax was a necklet composed of similar materials, together with the ivory pendants which attracted Evans' attention. According to Verneau (*C.A.P.*, 1906, vol. i., p. 74), the other two subjects were adorned with similar ornaments, but not so elaborately worked. He also directs attention to the flint knives, which, so far, had not been found in any of the other caves.

In 1894 another male skeleton was found. It lay on the left side in line with the axis of the cave, the legs crossed and the hands bent upwards. There was no evidence of the presence of the peroxide of iron in this case, but the usual perforated teeth and shells were in abundance, together with a hemispherical ivory pendant. Above the body were three large flat stones resting on side stones, thought to be for protection. Finally, near the bottom of the cave, M. Abbo gathered the carbonised bones of a human body which had also in life worn ornaments of *Nassa neritea*. (*Ibid.*, p. 75.) All the skulls

hitherto found in the Grimaldi caves are stated to be of the Cro-Magnon type.

Race de Grimaldi.—The discovery of the two skeletons, male and female, in the Grotte des Enfants, which Verneau describes as belonging to a new race, intermediate between those of Neanderthal and Cro-Magnon, marks an important addition to human palæontology. They lay close together in one trench, formed in a hearth-layer at a depth of 8.50 metres. The male was almost on its back, with the arms and legs flexed. The aged female lay, back upwards, with the arms and legs so strongly flexed beneath the body, that to retain them in



FIGS. 50 and 51.—Two Skulls from the Grotte des Enfants, Mentone—*race de Grimaldi*.
(After Verneau.)

this position it was thought they must have been ligatured. Beneath the habitable area on which the skeleton lay was an undisturbed bed, which contained the jaw of a rhinoceros, teeth of a bear, and some bones of the goat. In the upper strata bones and horns of the reindeer were found. The negroid skeletons belonged to a short, dolichocephalic, and highly prognathic race, to which M. Verneau proposes to give the name of *Race de Grimaldi*. Figs. 50 and 51 are reproductions of the illustrations of their skulls as figured by Dr. Verneau: that on the left belonged to the young man and that on the right to the aged female. The cephalic index of the former was 69.72 and that of the latter 68.58, and their respective heights were 1.54 metres (5 feet 0½ inch) and 1.58 metres (5

feet 2 inches). Judging from facial and cranial peculiarities, Verneau regards the race as having features slightly exaggerating those of modern negroes, and hence he sometimes calls them *Les Negroides*. (*L'Anthropologie*, vol. xiii., pp. 561-83.)

One of the most interesting facts in connection with these later discoveries in the Grotte des Enfants was that, 0.70 metre ($27\frac{1}{2}$ inches) higher up in the débris, another human skeleton was met with which presented in a marked degree all the



FIG. 52.—Two views of the Skull of Male Skeleton (Cro-Magnon type) found in the Grotte des Enfants. (After Verneau.)

physical characteristics of the "old man of Cro-Magnon," measuring approximately no less than 6 feet $3\frac{1}{2}$ inches in height, and a skull with a cephalic index of 76.26 (Fig. 52)—thus proving the existence of two very different races in the same locality, and almost on the same chronological horizon.

General remarks.—Of all the Grimaldi caves the Barma Grande was probably the richest in the works of man, and, had the excavations been conducted on more scientific principles, the results would have been commensurate in archæological importance. At the bottom were found the remains of an elephant, probably *Elephas antiquus*, and coarse implements of quartz and sandstone of Moustérien types. The superposition of the strata

both here and in the Grotte du Prince showed that the lowest, and therefore the oldest, represented a time when a fauna peculiar to a warm climate prospered at the Baoussé-Roussé. Reindeer bones appeared about the middle strata in the Grotte du Prince, and on a level with the skeletons in the former, thus proving that during the reindeer period man did not abandon his dead, but gave it a ceremonious burial.

The Grotte des Enfants seemed to have been inhabited almost without interruption, and contained several skeletons at different levels and of different ages. In its lowest deposits neither *E. antiquus* nor the hippopotamus was represented, only *Rhinoceros merckii*, and hence it is surmised that this animal survived the two former in that part of the world. The negroid skeletons belonged therefore to the middle Pleistocene period and were contemporary with the *Rhinoceros merckii*, but anterior to the Cro-Magnon man found in the same cave. No implements of the coup-de-poing type, nor bone objects of the artistic reindeer period of France, have been found in any of the Grimaldi caves.

According to Cartailhac all the skeletons, except the two negroids (*race de Grimaldi*), belonged to the Cro-Magnon race, and were all true burials of the Palæolithic period. The first man who came to the caves used Moustérien implements of quartz or limestone. M. Boule has shown that the lower strata in the Grotte du Prince, which contained some of these implements, also contained remains of *Elephas antiquus*, *Hippopotamus*, and *Rhinoceros merckii*, animals characteristic of the lower Quaternary period. The contents of the middle and upper strata indicated a change both in the climate and fauna. The cold period came on, and along with it its corresponding fauna—mammoth, woolly-haired rhinoceros, and reindeer—but the Moustérien type of industries still remained unchanged. (*C.A.P.*, 1906, p. 68.) The Grotte des Enfants has furnished an abundance of worked objects of flint, jasper, and bone, which Cartailhac characterises as Aurignacien. The deposits in all the caves are Palæolithic to the top, the Neolithic, which appear quite on the surface, being quite insignificant.

The Olmo Skull.

In 1863 a human skull, a pointed flint implement, the lower jaw of a horse, portion of the tusk of an elephant, and some charcoal were found in a railway cutting at a place called Olmo, in the valley of the Arno, above Florence. All these relics are described by Professor J. Cocchi (*L'Uomo ossile nell'Italia Centrale*, Milan, 1867) as lying on the same level within a few yards of each other, and at a depth of about 15 metres from the surface. They were embedded in a bluish compact lacustrine deposit of the Post-pliocene Age, under a mass of ancient and recent alluvial beds of ferruginous sand and gravel. M. Cocchi regarded the skull as belonging to the lower Quaternary period; but Forsyth Major and others made it out to be older. Subsequently M. Cocchi, in support of his opinion, announced at a meeting of a Geological Congress held at Lucca in 1895, that the entire skeleton of *Elephas antiquus* had been discovered 3 kilometres from the site of the Olmo skull, but in the same geological bed. (*B.P.*, 1897, p. 51.)

MM. de Quatrefages and Hamy have accepted this skull (*Crania Ethnica*) as an example of the Canstadt race; but geologists are not agreed as to the chronology of the lacustrine deposit, some regarding it (Forsyth Major) as Pliocene, while G. de Mortillet, judging from the form and workmanship of the flint implement, holds it to be Moustérien. The skull was badly fractured and the cephalic index is uncertain, owing to compression from the weight of earth under which it lay. No certain conclusions can therefore be drawn from the osseous characters of the Olmo skull.

The Eguisheim Skull.

In 1867 M. Faudel (*Bull. Soc. Hist. Nat. de Colmar*) reported the discovery of fragments of a human skull at a depth of about 8 feet in river-deposits, while digging a beer-cellar at Eguisheim, near Colmar. In various places in this same deposit were found a mammoth-tooth, the forehead of a great unknown species of stag, the metacarpal bone of a small horse, etc. The skull is said to have a similar appearance to that of Neanderthal, especially in the projection of the occipital

region, but the superciliary ridges were less prominent. It was, however, too fragmentary to supply more than suggestive results. The portions of the skull found consisted of the frontal and right parietal bone, and their relation to the Neanderthal cranium was discussed by Broca at the meeting of C.A.P. for 1867 (*Comptes rendus*, p. 395). Mr G. Schwalbe has made an elaborate analysis of its anatomical features in comparison with those of Neanderthal and modern types, and pronounces the Eguisheim skull to be an intermediary form, basing his opinion on the greater height of its forehead. (*Ueber die Schaedelformen der aeltesten Menschenrassen*, 1897.)

The Brûx Skeleton.

In 1882 portion of the skull and other bones of a human skeleton were discovered at Brûx, in Bohemia, buried in what is described as a bed of Quaternary sand. The skull lay 4 feet 8 inches from the surface, of which 2 feet was composed of the ordinary soil. Its contemporaneity with the Quaternary sand is, however, questioned on the ground that near the same place, at a depth of $6\frac{1}{4}$ inches in the sand, a perforated stone hammer of undoubted Neolithic type was also disinterred. The osseous characters of the Brûx skull place it, according to Hamy, between the Neanderthal and Eguisheim skulls. Those who regard the Brûx skull as Palæolithic account for the presence of the stone hammer in the Quaternary sands by supposing that it had got so far buried in consequence of the usual superficial disturbances caused by the cultivation of the soil. (*Mitt. der Anth. Gesell. in Wien*, 1872.)

Brünn Skeleton.

In September 1891, in the course of digging a canal at Brünn (Moravia), the workmen came upon an osseous deposit, at a depth of over 4 metres in the loess, containing bones and teeth of the rhinoceros and mammoth, some smaller bones of a brick-red colour, and a few worked discs of stone and bone. As the line of the canal only exposed a portion of the osseous deposit, a special excavation was necessary to secure all the

bones and other relics. This was successfully carried out, a couple of months later, by Mr Alex. Makowsky. A pit, ultimately covering an area of 8 square metres, was dug at the place indicated near the canal basin, and at a depth of 4.50 metres they encountered a layer of loess of a reddish colour. Up to this point nothing had been observed to indicate that the superjacent deposits had been previously disturbed. In this reddish deposit they found a mammoth's tusk, 1 metre in

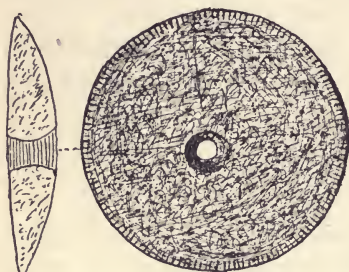


FIG. 53.—Disc made of Mammoth Tusk (§).

length, and about the thickness of a man's arm; but it was so friable, owing to decay, that it could only be abstracted in fragments. Immediately underneath the tusk lay an almost entire shoulder-blade of a mammoth, and close to it the skull and some of the upper trunk-bones of a human skeleton. It was only then ascertained that the

rest of the skeleton had been removed some weeks earlier, when the canal was being excavated. Incidentally a workman trampled on the skeleton, and so damaged the jaw-bones and the anterior portion of the right side of the skull. Within the radius of a metre from the human skeleton there were found the skull and some ribs of a rhinoceros, a few teeth of the horse, and the following relics of man's handiwork:—

- (1) Over 600 fragments of fossil tooth-shells (*Dentalium badense*), originally emanating from Tertiary deposits, some 10 or 15 kilometres south of Brünn, which were supposed to have been used as a necklet, or some kind of head ornament.
- (2) Two discs of limestone (14 centimetres and 15 centimetres in diameter), perforated in the centre by a large circular hole. Also sixteen smaller discs (from 3.5 centimetres to 6 centimetres in diameter), five made of stone, three of bone (ribs of rhinoceros), and eight of ivory. Some of these discs were perforated in the centre; and others were ornamented with marginal notches and grooves running from the centre to the circumference (Fig. 53).

- (3) A fragment of a polished implement made of a reindeer horn, having one end rounded, and the tooth of a rhinoceros, showing artificial markings on its surface.
- (4) The broken figure of a nude man, sculptured in ivory, said to be an "idol." What remained of it was in three portions, as shown on Fig. 54—the right arm, left hand, and the lower limbs being wanting. The trunk was perforated lengthways by a small hole, the lower orifice of which measured 4 millimetres, and the upper 1 millimetre.

The reddish colour of the loess in which these relics were found was due to a layer of ochre (oxide of iron, with some carbonate of lime and silica) which had been spread over the human skeleton.

The skull (Fig. 55) was extremely dolichocephalic and otherwise remarkable; but the former character might have been somewhat magnified by the injury it had sustained from the man treading on it. Towards the frontal and occipital

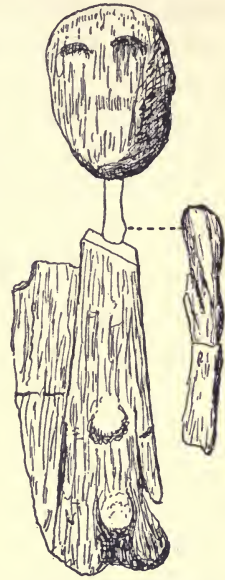


FIG. 54.—"Idol" made of Mammoth Tusk ($\frac{1}{3}$).



FIG. 55.—Side view of Skull of Brünn. (After Makowsky.)

regions it presented the characters of the Canstadt type, while its middle or temporal parts resembled the Cro-Magnon skull. Its estimated capacity, according to Professor Schaaffhausen,

was 1530 cubic centimetres. It is also said to have a strong similarity to another skull which was found in the loess in 1885, at a depth of 6 metres, as shown in the following measurements :—

| | Cro-Magnon Skull. | 1891 Skull. | 1885 Skull. |
|---------------------------|----------------------|-------------|-------------|
| | mm. | mm. | mm. |
| Antero-posterior diameter | 202 | 201 | 192 |
| Frontal transverse (max.) | 149 | 134 | 139 |
| (min.) | 103 | 95 | 90 |
| Horizontal circumference | 568 | 533 | 520 |
| Cephalic index . . . | 74 | 65.7 | 72.3 |

Both Mr Makowsky (*Mitt. der Anth. Gesell. in Wien*, vol. xxii., 1892, p. 73) and Professor Schaaffhausen (*Niederrh. Gesell. in Bonn*, 1892), to whose reports we owe these details, have come to the conclusion that the owner of the Brünn skeleton was contemporary with the mammoth. At the same time they suggest that the mammoth might have survived longer here than elsewhere in Europe. Judging from the class of associated relics, their style of ornamentation, and the application of red colouring-matter to the body, I agree with M. G. Hervé (*R.E.A.*, 1893, p. 20) in regarding the Brünn skeleton as belonging to the Transition or Proto-neolithic period, and hence it may be paralleled with those of Engis, Cro-Magnon, Grimaldi, Paviland, l'Homme-Mort, etc.

Skull of Podbaba.

On the 30th November 1883, a workman dug up a human skull from a depth of 2 metres in clayey soil, at a place called Podbaba, near Prague (Bohemia). It was associated in the same stratum with the remains of Quaternary fauna, among them being a mammoth-tusk, two skulls of the woolly rhinoceros, together with bones of reindeer and horse. All these are certified by Dr Fritsch, in a communication to the Society of Sciences of Prague, to have been on the same level as the human skull, and that the latter presented an outward appearance precisely similar to the other fossils.

The skull was, unfortunately, broken by the workman who disinterred it, and it was difficult to restore its form from the

collected pieces. It was dolichocephalic, with a remarkable depression of the forehead, and prominent eyebrows, which gave it a certain resemblance to the Neanderthal-Spy skulls. According to Schaaffhausen, the resemblance was not so strong as Dr Fritsch makes it. Not far from the original site of the Podbaba skull, but at a less depth than it, three skeletons of the Bronze Age had been found, one of which (a female) had a bronze bracelet on the forearm. These skeletons had dolichocephalic skulls, but not the extreme depression of the forehead which characterised the Podbaba cranium. Hence G. de Mortillet assigns it to the category of the doubtful. (*L'Homme*, 1884, p. 528.)

Cemetery of Predmost.

The station of Predmost, near Prerov (Moravia), was explored by Dr Karl Maska and MM. Wanken and Kriz during the years from 1882 to 1894, a brief report of which was given by Maska at the meeting of the International Congress of Anthropology and Prehistoric Archæology, held in Paris in 1900. Under the surface of the loess which covered the limestone of this district, at a depth of 2 to 3 metres, were found three archæological layers, of which the lowest was the largest and most important. Here, over an extended area, they discovered hearths, bones of the mammoth and other animals, as well as objects manufactured by man. The fauna, besides the mammoth, included the Arctic fox, wolf, reindeer, alpine hare, horse, glutton, polar bear, lion, bison, musk-ox, elk, beaver, and *Lagopus alpinus*. Most of the long bones and skulls were broken for their marrow, and some were burnt. As to the quantity of mammoth remains, Maska believed that there was no known station in which this animal was so largely represented. "Vous aurez," he remarks, "une idée de la richesse du gisement si je vous dis que l'on a ramassé à Predmost au moins deux mille molaires. Il convient de mentionner les os longs, fendus ou coupés en travers les crânes dont la calotte est brisée, et de nombreux fragments de défenses, épars." (*C.A.P.*, 1900, p. 130.)

The industrial remains numbered some 15,000 flint implements, together with a few specimens of rock-crystal and

obsidian, as well as a number of objects made of ivory and bone. The geometric ornaments and figures engraved on mammoth ribs, on ivory, on reindeer horn, and on small plaques of schist, he regarded as of much importance. Other ornaments consisted of Tertiary shells, perforated teeth of animals, and rude human statuettes fashioned from the phalanges of the mammoth. These and other objects were exhibited at the meeting as having been found on the habitable site, for no objects which could be regarded as grave-goods were found in the sepulchre.

But the most important discovery was a grave containing fourteen human skeletons, huddled together in a space measuring 4 metres in length by 2.50 metres in breadth, and protected by a covering of stone. The grave was 2 metres beneath the surface, in the same archæological stratum as the bones and relics. Other six skeletons were indicated by fragments of bone found close by, and it is significant that they were gnawed by carnivorous animals whose teeth-marks were still visible on some of the bones.

The human skulls in the sepulchre were so much broken that only one could be reconstructed. This specimen was dolichocephalic, like all the others found at Predmost, and showed a retreating forehead, prominent superciliary ridges, and much-worn teeth. From the measurement of the long bones the man was judged to be 1.80 metres in height (nearly 5 feet 11 inches). G. de Mortillet summarily rejects Dr Maska's idea that the sepulchre was the burial-place of the Palæolithic people who hunted the mammoths, which appear to have been formerly in great numbers in this part of Europe. Mortillet concludes his remarks as follows:—

“En tout cas l'homme de 1 m. 80 s'écarterait fortement de la taille normale de la race de Néanderthal” (*Le Pré-historique*, 3rd ed., p. 277).

Skull from Fürst Johanns Hole.

The cavern named after Prince John is situated near the town of Littau (Moravia), among a series of hillocks of Devonian limestone, and though not of very large extent it contains quite a labyrinth of chambers and galleries. In one of the first

chambers, 20 metres long, 12 metres broad, and from 2 to 3 metres high, Herr Szombathy, in 1881, discovered a human skull to which he attached great importance. In the upper bed of the cave-earth, underlying a sheet of stalagmite, bones of reindeer, *Bos primigenius*, *Ursus spelæus*, wolf, fox, etc., were met with. Along with them were small fragments of human skulls, indicating two individuals—one an adult and the other a young person. All the bones found in the cave were petrified and covered with calcareous matter of a greyish colour, which caused them to adhere to each other when they happened to be in contact. The archæological objects in this bed consisted of blades of flint, perforated teeth of reindeer and beaver, and a

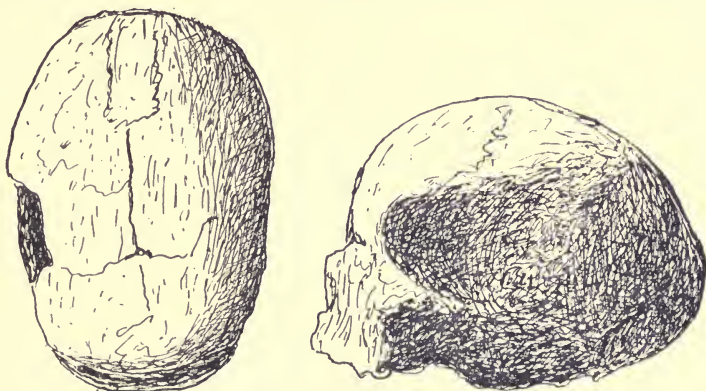


FIG. 56.—Side and top view of Cranium from Fürst Johanns Hole.
(After Szombathy.)

dagger made of a mammoth rib. In a side niche, about a metre distant from where the above-mentioned discoveries were made, a nearly complete human cranium, minus the lower jaw, was disinterred from the same cave-earth at a depth of about a foot (Fig. 56). A fragment of a reindeer rib was adherent to its right side, and portions of other bones were lying in its vicinity. Like all the osseous remains in this part of the cave the skull was encrusted with the same greyish calcareous deposit, proving that it was contemporary with the reindeer. The first and second molars on each side were the only teeth in their sockets. The third molars had not yet appeared, but they were in the course of formation in the alveolar groove. The cranium was well developed, as will be seen from the accompanying outlines. The antero-posterior and transverse

diameters were respectively 193 and 141 millimetres. (*C.A.P.*, 1900, p. 133.)

Sipka Jaw.

A fragment of a lower human jaw, discovered in the cave of Sipka (Moravia), has been published by Dr Karl Maska in 1881. It came from the lower portion of stratified *débris*, the upper of which contained remains of the mammoth, reindeer, woolly rhinoceros, *hyæna*, etc., associated with rude implements of quartzite. The dentition was so peculiar that M. Schaaffhausen regarded it as the jaw of a child of a giant pithecoïd, while Professor Virchow looked upon it as that of an ordinary adult without any simian characters. (*Le Préhistorique*, p. 263.)

Human Remains at Krapina.

Krapina is a village of North Croatia, on the bank of the Krapinica (an affluent of the Drave), which in Quaternary

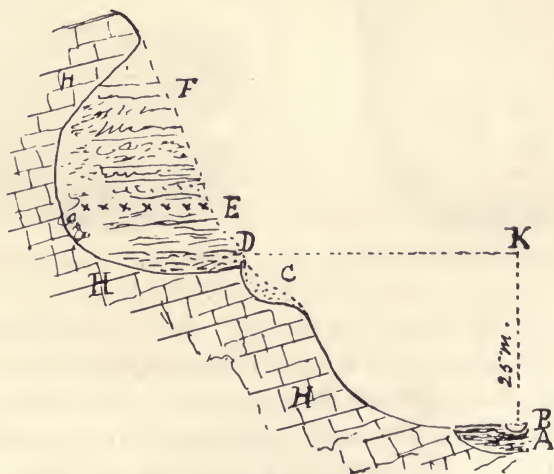


FIG. 57.—Section of the Rock-shelter of Krapina.

A, Recent alluvium. B, Present bed of Krapinica, 25 metres lower than its ancient bed, D. E F, Flood deposits intercalated with the *débris* of human habitations, 8·50 metres in depth. C, Pleistocene alluvium. H H, Miocene rocks.

times flowed 25 metres higher than at present. A cul-de-sac on the bank of the stream, which was then subject to inundations, was frequented by Palæolithic races of the vicinity. Ultimately the station became completely filled up by the refuse of human occupation, the *débris* of crumbling rocks, and intercalated beds of fluvatile deposits (Fig. 57). It was

explored by Dr Karl Gorjanovic-Kramberger, who has published the result in a series of four articles in the *Proceedings of the Anthropological Society of Vienna* (*Mitt.*, etc., vols. xxxi., xxxii., xxxiv., xxxv., 1901-5). On the alluvial beds were found various hearths, ashes, charcoal, bones of men and animals broken and sometimes burnt, together with implements of stone and bone. A few specimens of the industrial remains are here given (Fig. 58, Nos. 3-7) from which it will be seen that they are similar to those of the Moustérien epoch. Of worked objects of stone some one thousand pieces were collected, mostly of flint, but of which only about one hundred and fifty assumed the forms of

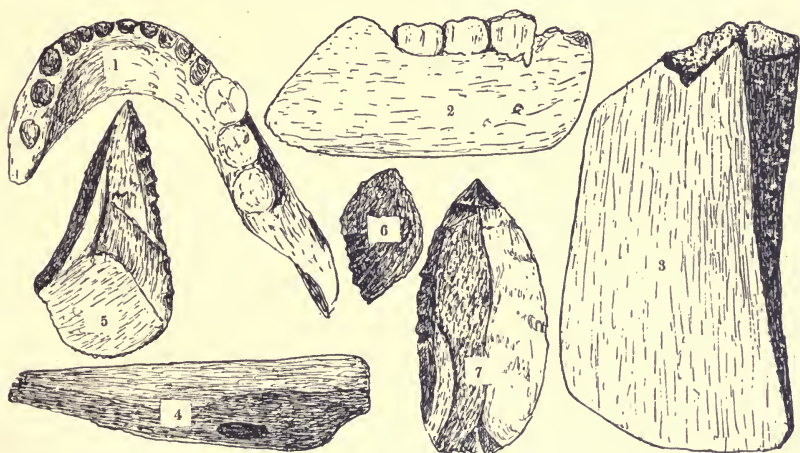


FIG. 58.—Relics found at Krapina (3). (After Gorjanovic-Kramberger.)

typical implements. Among them there was none approaching in form to that of the coup-de-poing. Two objects made of reindeer-horn (Nos. 3 and 4) are figured to show that this material had been utilised for industrial purposes.

The fauna includes remains of *Rhinoceros merckii*, and for that reason some anthropologists classify the station as belonging to the *Chelléen* epoch. But it has elsewhere been shown that this species of rhinoceros lived later than *E. antiquus* and hippopotamus. The *Ursus spelæus* was abundantly represented, especially in the upper deposits. The human remains consisted of fragments of ten or twelve skulls, more than a hundred of the other bones, and one hundred and forty-four isolated teeth—representing persons of all ages. All the frag-

ments were, however, so broken or badly preserved that they are of little scientific value. Some of them were found among the ashes and cinders around the hearths—a fact which suggests the hypothesis which Dr Kramberger adopts, that the inhabitants of Krapina were cannibals. Portion of an under-jaw is here figured (Fig. 58, Nos. 1 and 2), from Kramberger's illustration, which shows that the chin is undeveloped, in which respect it harmonises with the Naulette jaw and others of the Moustérien period. The discoveries at this station have given rise to much controversy, and among the literature thus produced the article of M. Obermaier in *L'Anthropologie*, 1905, p. 13, may be consulted with advantage.

Homo Heidelbergensis.

Professor Schoetensack of Heidelberg has lately described a human mandible found at a depth of 24 metres from the surface, in ancient fluviatile deposits of the river Neckar, at a place called Mauer, 10 kilometres south-east of Heidelberg (*Der Unterkiefer des Homo Heidelbergensis Leipzig*, Engelmann, 1908). A section shows the following deposits from above downwards:—

- (1) Recent loess, 5 metres.
- (2) Ancient loess, 6 metres.
- (3) A series of sandy beds alternating with strata of rolled gravel, about 15 metres thick, and containing erratic blocks transported by ice. Near the bottom of these beds was a layer of rolled gravels, mostly cemented by a calcareous infiltration, in which the jaw was discovered. It had not been water-worn, and was in excellent preservation. Along with it, in the same bed, bones of the following animals were found:—Stag, elk (*Alces latifrons*), cave-lion, horse (*Stenonis?*), *Rhinoceros etruscus*, and *Elephas antiquus*. The bones of the latter were very abundant, and among them, quite close to a mandible, lay the human jaw. Shells similar to those of the Cromer Forest beds were also found in the same deposits. M. Capitan, who writes a short notice of the Heidelberg jaw (*R.E.A.*, 9th March 1909), says that geologically the position of the jaw precisely dates it to the end of the Pliocene or beginning of the Quaternary epoch, which in his opinion corresponds with the

oldest gravels of Abbeville or Saint Acheul. It will be remembered that these latter deposits contained a similar fauna with flint implements, but no human bones. Hence the great importance of the Heidelberg discovery.

The accompanying tracings will at once disclose the chief osteological characters of the jaw (Fig. 59), viz., the enormous size of the ascending ramus, nearly double that of modern jaws; the absence of a chin; the canine teeth are not so highly developed as in some of the anthropoids, such as the gorilla; indeed the teeth may be paralleled with those of Australian savages. As a whole, the Heidelberg jaw falls into line with

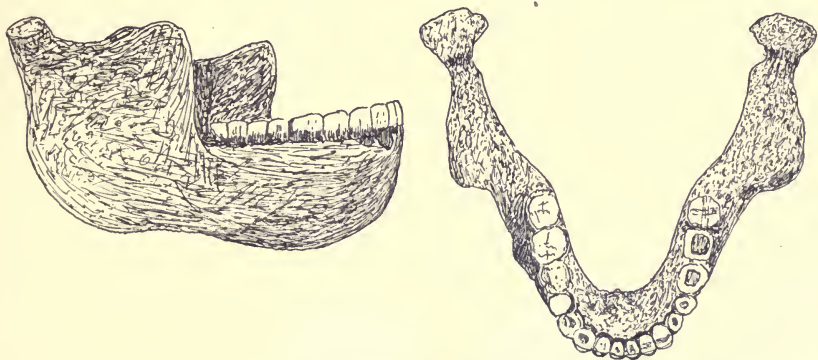


FIG. 59.—Two views of the Heidelberg Mandible. (After Schoetensack.)

those of Naulette, Spy, Krapina, Chapelle-aux-Saints, and Moustier, but none of them equal it in size.

The Gibraltar Skull.

The numerous and tortuous caverns which penetrate the Rock of Gibraltar were long known to contain ossiferous remains of men and animals, but it was not till 1863 that they were proved by the researches of Captain Brome, aided by Professor Busk and Dr Falconer, to contain the bones of Pleistocene mammalia. Of these researches Professor Busk has given a full report to the Prehistoric Congress held at Norwich (1869), which shows that the great majority of the human remains and works of art collected from these caves belonged to Basques who frequented them in Neolithic times. Among the Pleistocene mammalia were ibex, cave-lion, spotted

hyæna, serval, *Felis caffer*, grizzly bear, *Rhinoceros hemitæchus*, and African elephant. The presence of the latter in the south of Spain is another proof, as pointed out by Dr Falconer, that the two continents were formerly united. None of the Arctic fauna—mammoth, reindeer, or woolly rhinoceros—was represented in these caves. The human skulls were all much broken, but so far as could be determined from their fragmentary con-



FIG. 60.—Side and front views of the Gibraltar Skull. (After Professor Sollas.)

dition they were all dolichocephalic and orthognathous. The cast of one of the Gibraltar skulls, said to have been "excavated from brecciated talus behind Forbes battery under the north front of the Rock of Gibraltar," is exhibited in the Natural History Museum at Kensington. It is figured by Quaterfages (*Hommes fossiles*, etc., p. 61) under the title of *Crâne de Forbes-Quarry* (Gibraltar), as an illustration of the *Race de Canstadt*. Judging from the cast and its various published outlines (Fig. 60), this Gibraltar man must have been the most simian in

appearance of all the fossil men which have hitherto come to light from the Palæolithic period. It presents in a marked degree the characters of the Neanderthal-Spy type—retreating forehead, prominent superciliary ridges, and broad capacious orbits. For a critical discussion on the Gibraltar skull I refer readers to an article by Professor W. J. Sollas in the *Philosophical Transactions*, vol. cxcix. B, 1907.

Dr Keith informs us in his recently published volume (*Ancient Types of Man*, p. 121) that the Gibraltar cranium was brought to light in 1848;

“that it came to England in 1862 with an extensive collection of the remains of animals which had been excavated in the Genista Cave; and that it was examined by Mr Busk and Dr Falconer. Both were struck with the human cranium. Falconer, observing that certain features distinguished it from the modern type of cranium, proposed to recognise it as a type of a new variety of mankind, and to name the variety *Homo Calpicus*—from Calfé, the old name of Gibraltar. In 1868 Busk presented the cranium to the Museum of the Royal College of Surgeons of England, where it is now preserved. It has received the attention of anthropologists from the days of Huxley, Broca, Quatrefages, and Hamy to more recent days, when it has been studied by Macnamara, Klaatsch, Schwalbe, Sollas, and Sera. The point on which all are now agreed is that the *Homo Calpicus* belongs to the Neanderthal type of Pleistocene man.”

With regard to its dimensions and osteological characters, Dr Keith, who seems to have carefully studied these points, thus writes:—

“The cranial capacity is under 1100 cubic centimetres—200 to 300 less than in the examples of Neanderthal man found elsewhere, with the possible exception of one Krapina specimen. Although the size of the brain has not shown a progressive increase with evolution, still we must regard a small brain cavity in a primitive type of skull as an indication of antiquity. The total length of the skull is 192 millimetres, the brain making up 164 millimetres of this amount. In the Neanderthal skull the total length was 203 millimetres, with a brain length of 175. The proportion of the thickness of bone is therefore greater than in the Neanderthal skull. The width of the Gibraltar brain is 130 millimetres, the skull 142 millimetres. The width or cephalic index of the skull is thus 74 per cent. of the length. There is a slight indication of the brachycephalic character as seen in Krapina crania. It is, however, in the cerebral height that the primitive nature of this skull is evident. The height according to the writer's method of measurement is only 88 millimetres, 10 to 15 millimetres less than in the other Neanderthal crania, with the possible exception of some of the Krapina fragments.” (*Ibid.*, p. 125.)

Pleistocene Man in Jersey.

The cave known as La Cotte is situated in a cleft of the cliff which bounds St Brelade's Bay. This cleft is about 200 feet high, 40 feet wide, and some 150 in depth. The cave approximately measures 20 feet wide and 25 feet high, as measured from the floor reached by the recent excavations, which may not, however, be exactly the true floor. It has been partially excavated by the Société Jersiaise and several gentlemen interested in the discovery. A full report of the excavations and relics found in this cave, together with notes on a second cave in another part of the island, is published in vol. lxii. of *Archæologia*, by Mr R. R. Marett, M.A. The following abstract of the Jersey discoveries was submitted by the author to the Anthropological section of the British Association held at Portsmouth (1911), and is here reproduced by Mr Marett's consent :—

(1) "A cave named La Cotte de St Brelade, on the south coast of Jersey, has yielded (a) osteological remains, identified by Drs Smith-Woodward and Andrews, as those of a pleistocene fauna, woolly rhinoceros, reindeer, two kinds of horse, bovines, and deer; (b) nine human teeth, which Dr Keith regards as those of an adult individual of the Neanderthal type, and indeed as being in certain features more primitive than any hitherto known; (c) numerous implements of well-marked Moustérian facies, amongst which none are of the coup-de-poing type, with secondary chipping on both faces. These finds were all close together amongst the remains of a hearth not far from the cave entrance, under about 20 feet of accumulations, consisting of clay and rock-rubbish. Various interesting problems arise in regard to the geological cause of these accumulations, the source of the flint that served to make the implements, the connection of Jersey with the Continent implied by the fauna, and so on. The cave is at this present moment undergoing further excavation, and much remains to be done.

(2) "A cave named La Cotte de St Ouen, on the north coast, near the N.W. corner, has yielded implements of a Moustérian facies, but of a coarser workmanship, one of these being a heart-shaped coup-de-poing, whilst three others approximate to the same form. It is suggested that this cave belongs to an older Moustérian horizon than the other. Two separate hearths have been found here, the site having been recently searched completely. The stratification of the floor, which is about 4 feet deep, raised some important points.

(3) "Other evidence concerning pleistocene man in Jersey is scarce and uncertain; (a) sporadic flint implements have been assigned to the Moustérian and other palæolithic horizons; (b) a human skull, and elsewhere the bone of

a horse, have been found deep in the loess of the low-lying parts of the island, which, in some cases underlies the stratum containing remains of the early neolithic period; (c) the raised beaches of Jersey and the neighbourhood provide a problematic scale of emergencies and submergencies, into which may be fitted the particular emergence coinciding with the Moustérian occupation."

The most valuable result of the Jersey discovery is the direct evidence that, at the beginning of the Moustérien epoch, the island was part of the mainland of Europe. This inference suggests that the lands now represented as the British Isles were more elevated during the glacial and preceding interglacial periods than in the present day, and that then there was no sea hindrance between the cave-dwellers of Europe and Ireland, and probably land areas considerably farther west, but now submerged.

CHAPTER IX

*PITHECANTHROPUS ERECTUS*¹

THE remains of fossil man, on which I now wish to make a few observations, are those discovered in 1891-2 by Dr Eugene Dubois, on the island of Java, consisting of a calvaria, two molar teeth, and a left femur. After carefully comparing these bones with the corresponding parts of other human skeletons, both fossil and modern, and with those of the anthropoid apes, Dr Dubois published in 1894 a very complete memoir on the subject, giving descriptive details and photographs of each bone. In this memoir he attributes the remains to an animal having an erect attitude like man, and a brain-case with mixed characters, partly simian and partly human, to which he has given the name *Pithecanthropus erectus*. The conclusions arrived at by Dr Dubois have already been so largely criticised in the chief anthropological societies and journals throughout Europe, that it is unnecessary now to do more than to restate the main facts and arguments, in the light of some supplementary data which the author has more recently supplied in regard to the geological conditions under which the remains were found—a subject not very clearly elucidated in the original memoir. This information is contained in a paper communicated to the Royal Dublin Society on 25th November 1895 (*Scientific Transactions*, vol. vi., 2nd series) from which the following is an extract:—

“From Trinil to Ngawi the steep banks of the Bengawan or Solo river, for an extent of $7\frac{1}{2}$ miles, consist exclusively of the above-mentioned volcanic

¹ As the Java human remains were found beyond the European area I had some hesitation in introducing them into our present discussions. As, however, they are the only anthropological discovery of major importance hitherto found in any country outside Europe, I have included an abstract of a former notice of *Pithecanthropus erectus*, written shortly after Dr Dubois exhibited the Java remains at the principal anatomical schools of Europe.

sands and lapilli, cemented into soft rocks, very much like the rocks which I saw in the Siwalik hills. The strata have in this area a general dip S. of about 5 degrees, and are only concealed by a thin covering of vegetable soil. In these strata the Solo river had cut its channel 12 to 15 metres deep near Trinil. North and west of Trinil the Pliocene marl and limestone appear under them. When I first, in August 1891, came upon the rich bone-mine of Trinil, I had already made many finds of bones at several places round about the village. All belonged to the same homogeneous fauna which I had found in other parts of the Kendeng hills. The first fossil bones were a horn of small species of deer, which is amongst the commonest of the fauna, a molar tooth of *Stegodon*, and a few other remains belonging to the same fauna.

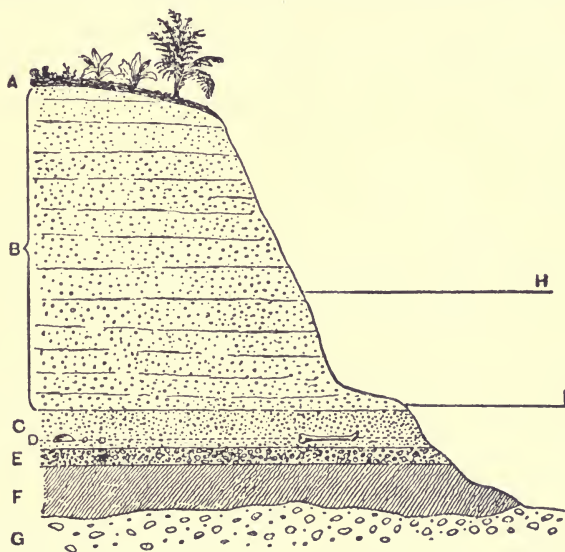


FIG. 61.—Section of the Bone Strata at Trinil. (After Dubois.)

A, Vegetable soil. B, Sand-rock. C, Bed of Lapilli-rock. D, Level in which the four human remains were found. E, Conglomerate. F, Clay-rock. G, Marine breccia. H, Rainy season, level of river. I, Dry season, level of river.

They were dug out of the rock by means of chisel and hammer, and the excavations were performed in such a manner that the rock was carefully removed in thin layers. It consists (Fig. 61) from higher to lower of variously coloured sand-rock, which becomes coarser, whilst more and more lapilli occur in it, and the latter prevail in the deepest bed, about one metre thick, passing downward over into a conglomerate bed. Under this follows a bed of hardened blackish clay, sharply separated, which does not contain any bones. The latter, in the sand-rock, increase in number from higher to lower, so that the lapilli bed is the richest: the conglomerate bed, however, contains but few bones.

“Among hundreds of other skeleton remains, in the lapilli bed on the left bank of the river, the third molar tooth was first found in September; then, the hole having been enlarged, the cranium a month later, at about one

metre distant from the former, but in the very same level of that bed. The species of mammals, of which remains were found in the same bed, are, for the greater part at least, extinct ones, and almost certainly none of them are at present living in Java. Among these remains we find a great number of the above-mentioned small species of *Cervus*, which certainly is not extant in the Malayan isles. Also many bones of *Stegodon* were found. One or two *Bubalus* species seem to be identical with Siwalik species; a *Boselaphus*, undoubtedly differs from the known species, living and fossil. Further on there were found the extinct genus *Leptobos*, the genera *Rhinoceros*, *Sus*, *Felis*, *Hyæna*, and others; a *Gavial* and a *Crocodile*, differing little from the existing species in India, but which cannot be classed among them.

"Of the animals found in the same strata in other places, the most interesting species are a gigantic Pangolin (*Manis*), three times as large as the existing Javanese species, and a hippopotamus belonging to an extinct Siwalik subgenus. Further, a Tapir and an Elephas.

"The work having been brought to an end that year on account of the setting in of the rainy season, it was taken up again at the beginning of the dry season in May 1892. A new cutting was now made in the left rocky bank, which comprised the still unfinished part of the old excavation. Thereby bones were again found in great numbers, especially in the deeper beds; and among these, again in the same level of the lapilli bed which had contained the skull-cap and the molar tooth, the left femur was found in August, at a distance of about 15 metres from the former; and at last, in October, a second molar, at a distance of 3 metres at the most from the place where the skull-cap was discovered, and in the direction of the place where the femur had been dug out. This tooth I did not describe, because I only found it later among a collection of teeth derived from the place stated above."

After explaining that certain irregularities observed on the surface of the skull-cap, ascribed by some to rubbing and by others to disease, were brought about in the place of deposit by acidulous water percolating through the rocks—all the other bones being more or less similarly corroded by it—the author goes on to combat the doubt whether the separate bones belonged to one and the same animal:—

"A doubt whether the four remains were once organically connected is certainly comprehensible, and was pronounced from different sides. Nevertheless, it seems to me that this doubt is hardly allowable, on account of the short distance of the places of discovery from one another—for a distance of 15 metres is so small that, as an argument against the supposition that the bones belonged to the same skeleton, it cannot be considered as of more importance than if the bones had been found in contact with one another. I often found bones from the self-same skeleton, and even fragments of one bone, at corresponding distances. I daresay that every palæontologist who has made any excavations for fossil vertebrate remains has had the

same experience. I never found in one place anything like a complete skeleton, and as certainly the bones once belonged all to complete skeletons, the bones must have been all dispersed. I have good reason to think that the animals perished in volcanic catastrophes, and that their corpses were brought down in the current of a large Pliocene river. Before, then, the bones were definitely deposited and buried in the old alluvia, they must generally have been separated through the rotting of the flesh, and torn the one from the other, and dragged away with the adhering flesh by crocodiles. Many remains of these preying water-reptiles; and also the traces of their teeth in spongy parts of bones, were found. So this argument against the assumption that the femur ascribed by me to the *Pithecanthropus* belonged to the same skeleton as the skull-cap fails."

The bones of *Pithecanthropus* had a chocolate-brown colour, and, in common with all others, human or not, were greatly

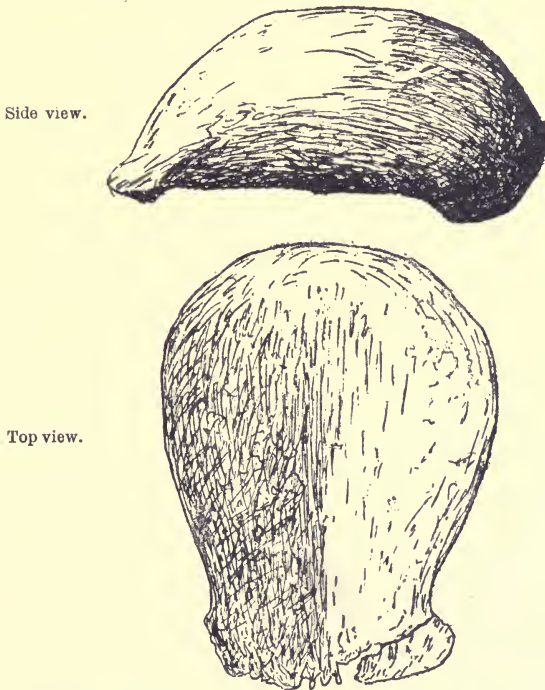


FIG. 62.—Skull of *Pithecanthropus erectus*. (After Dr Dubois.)

impregnated with calcareous matter, which rendered them exceptionally hard and heavy. The weigh of the femur is stated to have been double that of a recent human femur of the same dimensions.

The Cranium.—External surface (Fig. 62) generally smooth and without any marked ridges; sutures almost entirely

obliterated; frontal bone slightly keel-shaped in the line of the frontal suture; glabella, supraorbital ridges, and occipital protuberance strikingly prominent; cranial vault depressed, and on section (antero-posterior) shows an arch intermediate between that of the anthropoid apes and of the average European man. Its general dimensions may be thus stated:—

| | | |
|--------------------------------------|----------------------|-----------|
| Antero-posterior diameter (max.) | . . . | 185 mm. |
| Transverse | " " | 130 " |
| " | " (behind the orbit) | 90 " |
| Height in the parietal region (max.) | . . . | 62 " |
| Cephalic index | . . . | 70 |
| Estimated cranial capacity | . . . | 1000 c.c. |



FIG. 63.—Femur of *Pithecanthropus erectus*, found in Java (†).

(After Dr Dubois.)

Teeth.—As to the two molar teeth, there is so much difference of opinion among specialists—some considering them simian and others human—that it is unnecessary to add any further proof of their intermediate character. In Manouvrier's estimation the third molar has a decidedly simian character as regards the size of the fangs, but human as regards the crown surface. (*Bull. Soc. d'Anth. de Paris*, vol. vi., 4th series, p. 18.)

The Femur.—The femur (Fig. 63) has been regarded by most of the anatomists who have critically examined it as human—Professor Virchow being almost alone in maintaining that it might have belonged to an ape, probably *Hylobates*. Dr Dubois, however, lays stress on three minor characters which he thinks differentiate it from the typical human femur. But these distinctions have been conclusively shown to be untenable, as they have been found on recent human femora

with sufficient frequency to be ranked as human characters (see Manouvrier, *loc. cit.*, p. 15). Its length, from the highest point of the head to a line between the lowest points of the condyles, is 455 millimetres. The bone has suffered little injury, but it presents, on the inner and back part of the upper

third of the shaft, an irregular exostosis, due to some accidental cause during lifetime.

Such are the main facts on which Dr Dubois bases his theory that these four skeleton-bones belonged to a creature which was neither man nor ape, but a transitional form between the two (*eine menschenähnliche Uebergangsform*). It is not my intention to follow the author over the wide domain from which he has culled the arguments with which he supports his theory.

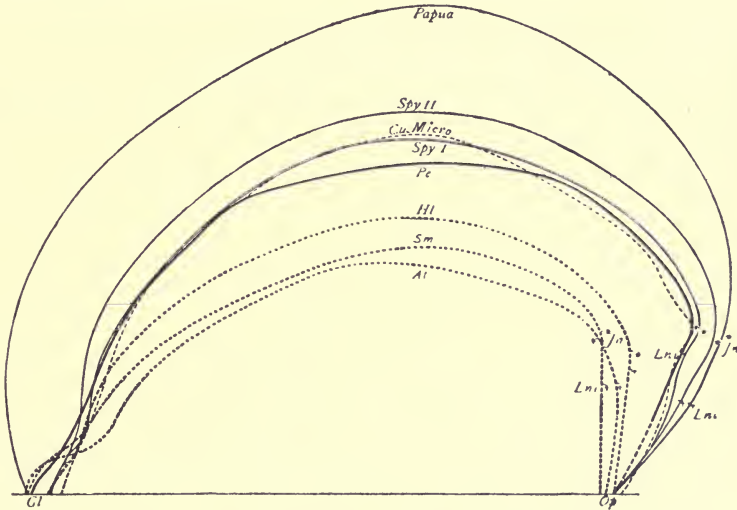


FIG. 64.—Profile outlines of the Skulls of *Pithecanthropus erectus* (Pe), a Papuan man, the Spy men, a Microcephal (*Cu. micro*), *Hylobates leuciscus* (Hl), *Semnopithecus maurus* (Sm), and *Anthropopithecus troglodytes* (At). (Dr Dubois.)

Gl=Glabella; Op=Opisthion; Ln=Linea nuchæ superior; Lni=Linea nuchæ inferior.

Suffice it to say that, by an elaborate series of measurements, comparisons, and calculations, he has shown that the brain-capacity of the Java skull ranks considerably lower than that of man, but higher than that of any of the anthropoid apes. Some idea of the value of the results thus obtained may be gathered from an inspection of the accompanying diagram (Fig. 64), in which the profile outline of the skulls of a Papuan, the fossil "men of Spy," a microcephal, and a number of apes are superimposed so as to exhibit at a glance the expansion of their respective cranial arches.

Dubois on his Critics.

The publication of Dr Dubois' elaborate report on the Java human remains has called forth a large amount of criticism from a number of the most eminent anthropologists throughout Europe. In an article in the *Anatomischer Anzeiger* (vol. xii., 1896) he classifies his reviewers under three groups, according as they have declared themselves in favour of one or other of the following interpretations put on the anatomical features of the calvaria.

1. Those who regard the skull as human :—
 - W. Turner, *Journal of Anatomy and Physiology*, 1895, vol. xxix., pp. 424-45.
 - D. J. Cunningham, *Nature*, vol. ii., 1895, p. 428.
 - A. Keith, *Science Progress*, vol. iii., p. 348; *Proc. Anat. Soc.*, February 1895.
 - R. Lydekker, *Nature*, vol. ii., p. 291.
 - Rud. Martin, *Globus*, vol. lxxvii., p. 213.
 - P. Matschie, *Naturwissensch. Wochenschr.*, vol. x., p. 81.
 - P. Topinard, *L'Anthropologie*, vol. vi., p. 605.
2. Those who regard the skull as simian :—
 - R. Virchow, *Verhand. Berliner Anth. Gesel.*, 1895, pp. 81, 336, 435; *Die Nation*, 1895, p. 53.
 - W. Krause, *ibid.*, p. 78.
 - W. Waldeyer, *ibid.*, p. 88; *Anth. Congress Kassel*, 1895.
 - O. Hamann, *Gegenwart*, January 1895.
 - H. Ten Kate, *Nederlandsch Koloniaal Centraalblad*, 1895, p. 128.
3. Those who regard the skull as a transitional form :—
 - E. Dubois, *Jaarboek v. h. Mynwezen in Nederlandsch Indie*, 1892; *Pithecanthropus erectus*, etc., Batavia, 1894; *Leidener Zool. Cong.*, 21st September 1895; *Roy. Dublin Society*, 20th November 1895; *Anth. Inst. of Great Britain and Ireland*, 25th November 1895; *Berliner Gesellschaft für Anth.*, 14th December 1895, etc.
 - L. Manouvrier, *Bull. Soc. d'Anthrop.*, vol. vi., 4th series; *Revue Scientifique*, vol. v., 4th series, 1896, pp. 289-99.

- O. C. Marsh, *American Journal of Science*, 1859, vol. lxi.
- E. Haeckel, *Syst. Phylogenie des Wirbeltiere*, p. 633.
- A. Nehring, *Naturwissensch. Wochenschr.*, 1895.
- R. Verneau, *L'Anthropologie*, vol. vi., p. 725.
- A. Petit, *ibid.*, p. 726. Previously regarded as human (*ibid.*, p. 65). (The references here given are from Dr Dubois' paper, but I have not been able to verify them all.)

Looking at the list of distinguished names here marshalled in battle array, it must be allowed that, in penning the following words, Dr Dubois has scored a point against his opponents, though, perhaps, at the expense of a little pardonable sarcasm :—

“Ein—im Vergleiche mit normalen menschlichen—so kleiner und in seiner Form so affenähnlicher Schädel, dass er von nicht wenigen erfahrenen Anatomen für einen Affenschädel erklärt wurde, kann nicht menschlich sein !” (*Abdruck aus Anat. Anzeiger*, vol. xii., 1896. p. 13).

G. de Mortillet on Dubois' Critics.

But it remains for G. de Mortillet to complete the irony of the situation. This is how he classifies the controversialists in a recent article in the *Revue Mensuelle de l'Ecole d'Anthropologie*, entitled “Précurseur de l'homme et Pithecanthrope” :—

“La découverte d'Eugène Dubois fit grand bruit. Le soin avec lequel il l'a publié, l'activité qu'il a déployée, et l'heureuse idée qu'il a eue de présenter les pièces originales dans tous les grands centres de travail l'ont fait étudier et discuter de toutes parts. Mais les avis ont été on ne peut plus partagés. Ils se sont tout d'abord parqués par nationalités. Les Anglais, bien que compatriotes de Darwin, ont fait de grands efforts pour démontrer qu'il ne s'agit que d'un homme, un homme très inférieur, mais déjà un véritable homme. Les Allemands, au contraire, se sont froidement ingéniés à prouver qu'il ne s'agit que d'un singe. Les Français ont purement et simplement adopté les déterminations du jeune savant hollandais. C'était chose facile pour des compatriotes de Lamarck. C'était chose d'autant plus naturelle que la division en parts à peu près

égales des opinions extrêmes est plus que suffisante pour bien établir qu'on est en présence d'un être intermédiaire.

Dans un article publié en Septembre 1896, W. Dames (*Deutsche Rundschau*, September 1896, p. 368), a fait le relevé de l'opinion de vingt et un auteurs de nations diverses concernant les pièces provenant de Trinil.

En voici le résumé. (*Revue Mensuelle de l'Ecole d'Anth.*, 15th October 1896, p. 313.)

| Indication des pièces. | Attributions à l'homme. | Considérés comme intermédiaires. | Attributions aux singes. |
|----------------------------|----------------------------|--|-----------------------------|
| 2 ^e Molaire . . | ... | 5 | 2 |
| 3 ^e Molaire . . | 4 | 6 | 6 |
| Fémur . . | 13 | 6 | 1 |
| Calotte crânienne . | 6 | 8 | 6 |

*The Java Remains considered from a Wider Standpoint
than that of Pure Anatomy.*

In these circumstances it may well be asked, How are we to ascertain the real truth of this important matter? Are we to regard the being who owned the Java bones as an ape; or as a specimen of early humanity; or as the long-desiderated "missing link" which was to bridge over the wide gap between civilised man and the lower animals? Or, is it really necessary to formulate these alternatives at all, for may they not indicate one and the same thing, their seeming difference being due to the different standpoints from which the phenomena are contemplated? To form a rational opinion on these problems we must, I fear, cast our eyes beyond the debatable field of petty anatomical distinctions. For, after all, it seems to me that, except in a very general way, human anatomy furnishes but little evidence on the line of the descent of man.

Shortly after the publication of Dr Dubois' original memoir Professor Sir William Turner communicated a paper on the subject to the Royal Society of Edinburgh, in which he maintained that the Java skull-cap presented no specific characters which were not also to be found on other human skulls. "If we accept," says Sir William, "that the Pleistocene deposit in

Java, in which this specimen was found, is of the same geologic age as the European Pleistocene, there is nothing in the configuration of the skull-cap to place it in a different category from those remains of human Quaternary Man obtained in Europe, which already have been referred to as possessing similar characters" (*Proc. Roy. Soc. of Edinburgh*, vol. xx., p. 436).

The thigh-bone he regarded as human, but its *locus standi*, as evidence, was rejected on the ground of the extreme improbability that it was a thigh of the skeleton to which the calvaria belonged. Subsequently, after having seen the actual bones, and heard Dr Dubois' further explanations both in Edinburgh and London, he still adhered to his formerly expressed opinions; but with regard to the thigh-bone he made the following explanation:—

"If, however, the thigh-bone and calvaria belong to the same skeleton, and Dr Dubois, from his personal examination of the locality, has no doubt on this point, the establishment of the human character of the femur would require us to regard the calvaria as also human" (*Jour. Anth. Inst.*, vol. xxv., p. 250).

When Sir William Turner read his paper I had an opportunity, in the course of the discussion which followed, of remarking that there could be no difficulty in assigning the femur and skull to the same individual, since, in accordance with the doctrine of evolution, the former would have acquired its specific characters long before the latter, because the attainment of the erect posture, and the consequent specialisation of the fore-limbs into manipulative organs necessarily preceded, and, indeed, partly accounted for, the higher mental organisation of man. The erect posture and a larger brain were, in my opinion, sufficiently characteristic to place man in a separate category at the head of the great chain of organic life. (See *Prehistoric Problems*, pp. 170-8.)

The full text of my address at the British Association (1893) on this subject was at the time published in several scientific journals, and is referred to in Dr Dubois' original memoir. But, notwithstanding, the doctrine thus enunciated does not appear to have made much impression on the minds of Dr Dubois' eminent critics, as only two of them, so far as I have had access to their productions, viz., Dr Arthur Keith and

Professor L. Manouvrier, have even mentioned the idea as a possible explanation of the peculiarities presented by the Java skeleton. The opinions of these two gentlemen are all the more valuable, inasmuch as it does not appear that either of them derived their inspiration from anything previously written on the subject.

Dr Keith (*Science Progress*, vol. iii., July 1895, p. 368) thus writes :—

“It seems to me, however, highly probable that the frame of man reached its perfection for pedal progression long before his brain attained its present complex structure. If one conceives this probable, or even possible, there is no hindrance to awarding the femur to the Bengawan woman.”

This, though short, is perfectly explicit in support of the principle of my contention. Professor Manouvrier discusses the question at much greater length, and several passages could be quoted from his writings, but perhaps the following will be sufficient for our purpose :—

“L'évolution humaine de ce fémur aurait donc été plus rapide et plus complète que celle de crâne et des maxillaires. Or, cela n'infirmerait en rien les deux hypothèses précédentes. Il est très vraisemblable, en effet, que si une race d'anthropoïdes grimpeurs a pu évoluer vers le type humain sous l'influence de conditions quelconques, l'adaptation de ses membres inférieurs à la marche a dû être rendu libre pour des fonctions autres que la locomotion, les membres supérieurs et déterminé ainsi le progrès cérébral. J'ai déjà insisté ailleurs sur cette remarque.” (*Mémoires de la Soc. d'Anthropologie de Paris*, 2nd series, vol. iv.)

“On trouve, d'ailleurs, actuellement, des races humaines, très arriérées sous le rapport de la forme du crâne, qui ne le cèdent en rien aux races européennes sous le rapport du fémur. Il n'y aurait donc pas lieu de s'étonner de trouver une race humaine tertiaire ou quaternaire plus avancée sous le rapport de l'évolution fémorale que sous le rapport de l'évolution crânienne.” (*Bulletins de la Soc. d'Anthropologie de Paris*, vol. vi., 4th series, 3rd January 1895, p. 33.)

Dr Dubois, also, in his article to the Royal Dublin Society, particularises and adopts these views in the following manner :—

“Manouvrier and Dr Arthur Keith point out that the human form of the Trinil femur is not sufficient to prove that it did not belong to the same individual as the skull-cap ; for, the phylogenetic evolution of the human femur ought to have preceded that of the skull, as the erect attitude and the erect locomotion have been the cause of the intellectual perfection. Suppose a species of Anthropoid Ape—whose frame rather resembles the human—suppose a large *Hylobates* should strive to perfect the pedal locomotion, which this

genus already has when walking on the ground—it would, on account of the close relation existing between form and function of the femur, be hardly imaginable that this bone could be different from that of man in important characters. In the opinion of Manouvrier, Keith, and myself, there might therefore exist a form, the skull of which had still many simian peculiarities, whilst the femur was to be distinguished from the human bone in quite subordinate and mechanically unimportant characters only." (*Scientific Transactions*, vol. vi., 2nd series, p. 9.)

With regard to the above notice of *Pithecanthropus erectus* there are only two points on which I now wish to make a few remarks :—

(1) The femur, whether or not it belonged to the individual who owned the skull, proves conclusively that a being existed in Java towards the close of the Pliocene period which had then assumed the erect posture. This deduction is of the greatest importance as a factor in the problem of human evolution, because it shows that at this date the upper limbs had already been relieved of their locomotive functions. The further inference, that the being was at least to some extent a tool-maker, is also legitimate, although none of his handicraft works have been as yet identified. Some day it may be shown that the Java man and "eoliths" belong to the same geological horizon.

(2) The second point is that the Java skull is much less in size than any of those of Palæolithic races hitherto found in Europe, and as the Heidelberg mandible is the largest known, there are no grounds for supposing that the Java man belonged to the same race as the giant of Heidelberg. Hence the two must be provisionally classified as representatives of two distinct races. The difference between the Java skull and those of the Neanderthal-Spy race will be better appreciated by the annexed comparison of the length-breadth measurements of the former with those of one or two of the latter.

| | Spy. | Neanderthal. | Galley Hill. | Java. |
|---------------------------|------------|--------------|--------------|------------|
| Antero-posterior diameter | mm. 200 | mm. 200 | mm. 203 | mm. 185 |
| Transverse diameter . | 140 | 144 | 130 | 130 |
| Cephalic index . | 70 | 72 | 74 | 70 |

CHAPTER X

THE PALÆOLITHIC RACES OF EUROPE: THEIR CULTURE AND CIVILISATION

1. PALÆOLITHIC RACES OF EUROPE.—(1) Homo Heidelbergensis; (2) Neanderthal-Spy Race; (3) Magdalénien Race; (4) Cro-Magnon Race; (5) Race de Grimaldi.
2. EVOLUTION OF ARTS AND INDUSTRIES.—Wall Pictures. The Sculptured Rocks of Cap-Blanc. Human Representations. Concluding remarks.

WE now come to the summing up of the stray facts brought under your notice during our incursion into the domain of Anthropology, with the view of synthetically constructing an intelligible and fairly accurate description of the intellectual status and social culture which our prehistoric forefathers of the Palæolithic period attained to in the scale of human evolution. In doing so, let me again emphasise the fact that fossil remains were not intentionally preserved for the purpose of instructing modern anthropologists—a fact sufficiently attested by their fragmentary condition, which makes it often hazardous to draw any inference from the remains, however suggestive they may be. Then again, the associated relics may be tantalisingly scanty, or altogether absent. How much more valuable would have been the information recorded in Dr Buckland's careful description of the Red Woman of Paviland had the complete skeleton been present. Here we have the ceremonial burial of a tall female adorned with ornaments made of ivory and shells, accompanied with special rites which are now known to have been common in Palæolithic times, and actually associated with remains of the mammoth, rhinoceros, bear, hyæna, etc. Had the skull been forthcoming to show that this woman belonged to the race of Cro-Magnon—a fact suggested by the exceptionally large size of the skeleton—there

could be no reasonable doubt that the Paviland interment would be a precise parallel to those of the caves of Grimaldi in Italy.

It will also be borne in mind that all the fossil human remains reviewed in the previous lectures have not the same archæological value, some being deficient owing to decay of particular bones, and others probably from defective observations. But, after making due allowance for possible imperfections in the records, there remains a sufficient amount of trustworthy evidential materials to show that there were, at least, four or five human races living during or towards the close of the Pleistocene period in Europe—without counting the brachycephalic people who are supposed to have been immigrants into the country, and, consequently, were only contemporary with the former during the transition period.

I. PALÆOLITHIC RACES OF EUROPE

The physical characters of these races may be thus briefly defined, without loading our description with minute anatomical details :

(1) *Homo Heidelbergensis*.

Of this race there is only one mandible known (Fig. 59), and the circumstances under which it has been discovered have already been described. In some respects it is the most simian-like bone that has hitherto come to light, but as regards the relative size of the teeth it seems to come nearer the human arrangement than some other known jaws. If geologists are correct in defining the stratigraphical deposits in which it had been preserved as Pliocene, it must be regarded as the oldest fragment of fossil man in the world, with, perhaps, the exception of *Pithecanthropus erectus*. It is wonderfully well preserved, and in massiveness it exceeds all known human mandibles.

(2) *Neanderthal-Spy Race*.

This race, with the exception of that represented by the Heidelberg jaw above referred to, is the oldest in Europe of which we have any knowledge from the remains of the actual skeletons of its individual members. From an examination of these bones and their associated relics the range of the race,

both in space and time, is fairly well determined. As the fabricators of the coup-de-poing they roamed along the river valleys and primeval forests of central and western Europe, which then teemed with subtropical animals and fruits sufficient to supply them with sustenance, with little manual labour. It was not, however, till the climatic change which culminated in the recrudescence of another *mer de glace* that a few of their actual bones were discovered.

Their physical characters were originally deduced from the skeletons of Neanderthal and Spy, being the earliest discovered; but since then numerous other skeletons have been found which confirm the correctness of these characters as typical features of the race. They are as follows (see Figs. 8, 9, 29, 30):—

Cranium dolichocephalic (cephalic index 70-75); forehead low and retreating (platycephalic); superciliary ridges very prominent; chin undeveloped, sloping backwards; alveolar prognathism strongly marked; stature small, about 5 feet 3 inches.

Distribution.—Neanderthal, Spy, Naulette, Malarnaud, Chapelle-aux-Saints, Moustier, Ferassie, Marcilly-sur-Eure, Brechamps, Quina, Petit-Puymoyen, Sipka, Krapina, etc.

The most ancient remains of the race are thus, so far as actually known, not older than the Moustérien epoch; but that their ancestors were in Europe for a very long time previously is sufficiently proved by the large numbers of stone tools and weapons which have been gathered along their haunts and byways. Possibly the Heidelberg jaw may have been owned by a stalwart individual of this early race—an idea suggested by the fauna associated with it, and the fact that it has not yet been conclusively proved that the gravels of Mauer are as old as the Pliocene Age, as was formerly supposed.

(3) *Magdalénien Race.*

The next people of whom we have sufficient information to fix their chronological horizon, by associating their skeletons with a remarkably well-defined group of industrial remains, are the reindeer-hunters of France, whose works of art have so greatly astonished the civilised world of modern times. They

are osteologically represented by three skeletons, viz., that of *l'Homme écrasé* of Laugerie Basse (Fig. 36), that of Chancelade (Fig. 37), and that of Duruthy. Their special characters are as follows :—

Crania well filled (dolichocephalic, cephalic index 72-74); forehead full and lofty; superciliary ridges moderately prominent; chin well formed; orthognathic profile; stature small, 5 feet 2 inches to 5 feet 4 inches.

The Magdalénien people appear to have been the direct descendants of the Neanderthal-Spy race, and to have occupied, not only the same geographical area, but a considerable extension of it, as shown by the stations discovered within regions formerly covered by glacier ice. Their well-filled skulls are an indication of the intellectual advancement that had taken place since their nomadic forefathers entered Europe.

(4) *Cro-Magnon Race.*

The physical characters of this race have been derived from one specimen, viz., that known as the old man of Cro-Magnon (Figs. 33, 34):—

Cranium highly developed (dolichocephalic, cephalic index 73-76); forehead large, lofty, and well shaped; superciliary ridges fairly prominent, face short but broad; chin well formed; face orthognathic; stature tall, over 5 feet 10 inches in height.

The Cro-Magnon skull has, in point of osseous development, some resemblance to those of the Magdalénien race, and hence it is sometimes classified as belonging to it. But in my opinion, the great size of the Cro-Magnon skeleton is sufficient to place it in a category by itself. The geographical distribution of the race, so far as at present known, is almost confined to the Grimaldi caves, where out of about a dozen skeletons sufficiently well preserved to have their osteological characters determined, all have been recorded as belonging to the Cro-Magnon type, with the exception of two which M. Verneau describes as a new race. Moreover, the position of the Cro-Magnon skeletons in the cave, as already explained, makes it more than doubtful if they were of the same age as the Moustérien débris which it contained. That, however, they

date back to the end of the Palæolithic period is almost certain, from the great thickness of the talus that covered the entrance to where the skeletons were found.

(5) *Race de Grimaldi.*

Of this race only two skeletons have hitherto come to light (Figs. 50, 51), viz., the two already described as having been found in the Grotte des Enfants, one of which was that of a young man, and the other that of an aged female (probably members of the same family). They lay close to each other and evidently belonged to the same race, with a type of skull which Dr Verneau describes as negroid, and disclosing anatomical characters intermediate between those of the Neanderthal and Cro-Magnon skeletons. Their physical characters may be thus stated:—

Cranium elliptic and dolichocephalic—cephalic index (male) 69.72, (female) 68.58; forehead fairly well developed; face strongly prognathic; chin slightly receding; stature small, 5 feet to 5 feet 2 inches in height.

The position of these negroid skeletons in the cave was nearly $2\frac{1}{2}$ feet lower than another skeleton, which measured 6 feet $3\frac{1}{2}$ inches from head to foot—a veritable giant, described by Dr Verneau as belonging to the Cro-Magnon race. All the skeletons of the Cro-Magnon type found in the Grimaldi caves were ceremonial interments, with the exception of one body which had been carbonised; but as ornaments, precisely similar to those found with the inhumed bones, were associated with the carbonised bones there can be little doubt that the latter also belonged to the Cro-Magnon race.

2. EVOLUTION OF ARTS AND INDUSTRIES

As few of the Palæolithic races can be associated with precise cultural elements we shall not attempt to classify them as belonging exclusively to one or more of the special epochs into which anthropologists have divided the Quaternary period. At the outset I gave a brief description of these epochs as marking convenient divisional stages in the general march to the goal of civilised life, and hence some repetition of what was then said is unavoidable in a consecutive sketch of the rise

and progress of the arts, industries, and artistic attainments of these remarkable races. But such overlapping is more apparent than real, as the notices in Chapter II. are mostly restricted to the details of the stations from which the terms Chelléen, Acheuléen, Aurignacien, Solutréen, and Magdalénien have been derived. These names are merely conventional landmarks adopted, more as a matter of convenience, for describing the progressive development of humanity. In what respects the Aurignacien man differed from the Solutréen, or the Magdalénien, it is difficult to say. From the Moustérien up to the Magdalénien there has been a steady evolution in arts, industries, and domestic economy, all leading to higher ideals and greater social comfort. It is no doubt desirable to define, with as much precision as possible, the successive increments in the social culture of these ancient people; but to dwell on such details, as whether this or that particular form of flint implement is characteristic of this or that epoch, is beyond my present limits. That is the work of experts, which can only be exhaustively dealt with in special monographs. Not only is this field of research subject to alterations from day to day by fresh discoveries, but many of the disputed objects take an equally important place among the relics of different epochs. When did Palæolithic man begin to utilise bone and horn as suitable materials for the manufacture of implements, or weapons, or ornaments? When did he first resort to the art of engraving on stone, bone, horn, and the walls of his favourite caverns? Was Palæolithic man a religious being? These are but specimens of the shifting sands which do duty for the precise progress of events—for different and even contradictory answers have been given to all these queries. Classifications are made to-day only to be undone on the morrow.

My special duty, on the present occasion, is to decipher from the abundant materials at my disposal the progressive improvements, manner of living, and general culture of these early people. For this purpose we have to note in passing their accumulated inventions, which extend over a great length of time, covering, at least, one interglacial warm period and a subsequent glacial advance of a prolonged and probably intermittent character. During these long ages our sapient ancestors

made great progress, both in the acquisition of manipulative skill and in the development of their mental faculties, proofs of which we have in their handicraft works, and in the gradual increase in their brain-cases. These were the trophies of their struggle for existence during the adverse conditions which obtained in Europe under the chilling influence of the last glacial period. But, sad to relate, the splendid attainments thus acquired were soon afterwards rendered almost nugatory by the inscrutable decrees of Nature, which again changed the physical elements of the environment, to such an extent that their old hunting-grounds were no longer suitable for the life habits of the reindeer and the other big game on which they depended for their livelihood. The consequence was that the northern fauna gradually died out in Central Europe, and left the highly equipped Palæolithic hunters to their own devices. The problem they had now to face was to make bricks without straw. We shall elsewhere see (Chapter XI.) that they solved this problem by turning their experience and mental endowments into new channels, where they devised other methods of subsistence so important to humanity as to revolutionise life on the globe.

Judging from their osseous remains and a few sidelights gathered from collateral sources, these early troglodytes must have had a strong likeness to the anthropoid apes of the present day. Their later descendants, who became no mean artists, depict themselves as being covered over with hair, and, of course, the earlier races would also be *a fortiori* hairy. With large orbits, overhanging eyebrows, small, narrow, and retreating forehead, thick heavy jaws, prognathic profile, and short muscular limbs, these hairy representatives of the Neanderthal-Spy type of humanity would form an ugly contrast to the modern inhabitants of Europe. No wonder that some of our sentimental friends would like to ignore the inevitable inference that these simian-like creatures were our actual forefathers. It is probable that successive generations would possess brain-cases which, in point of development, would be intermediate between the typical Neanderthal-Spy and Magdalénien skulls. As a matter of fact such skulls have turned up. The Spy skull (No. 1) was associated with

a second (No. 2) which showed less of the simian characters than the former. With regard to the skulls of Eguisheim, Brûx, and Engis, which are described as having Neanderthaloid characters, there is usually a rider to this statement to the effect that these features were less marked than in the original prototype, *i.e.*, that they were toned down by the modifying influences of a progressive civilisation.

If the hypothesis that the earliest inhabitants of Europe first appeared during the last warm interglacial period be correct, we have ample and sufficient materials for following their subsequent career till the close of the Palæolithic period, when they and their contemporary fauna apparently disappeared off the stage of existence. As neither house nor clothing was necessary in the subtropical climate which obtained at the commencement of their career, the products of their handicraft skill were of little use, as abundant food-supplies were always to be had without much labour. They lived in small family groups, leading a lazy, monotonous life, with few events to quicken the reasoning faculties. In these circumstances their implements, weapons, and ornaments were of the most meagre description; and this phase of life continued in *statu quo* from one generation to another. The coup-de-poing, their characteristic implement (Pls. I. and II.), seems to have been used for a great variety of purposes. It was the outcome of long experience, and, in point of utility, combined the functions of the elaborate array of mechanical tools which ultimately, under changed conditions of life, came into requisition. G. de Mortillet has described this remarkable implement as almost the only one in use during the Chelléen period; but this must be accepted as a pardonable exaggeration, as we find, both in the station of Chelles and that of Saint Acheul, a number of primitive tools, such as knife-flakes, scrapers, and various pointers. At the same time it cannot be denied that the coup-de-poing remained for a very long time as a *sine qua non* among the domestic appliances of these nomads. But a modicum of progress has to be noted even in these early stations, as proved by the more recent discoveries in the Somme Valley. The whole series of worked flints found at the different stations and terraces of Saint Acheul

disclose a gradual evolution in workmanship, but, strange to say, there is among them scarcely a single specimen that can be called a weapon—a fact which suggests that it was only after the inhabitants became troglodytes that they took to hunting the big game which entered Central Europe during the advent of a colder climate. The technique displayed in the manufacture of the coup-de-poing indicates great progress in manipulative skill since man first took to using external objects as ornaments, tools, and weapons of offence and defence. At first these would be hardly distinguishable from natural objects—pebbles and sticks picked up at random on account of their suitability as hammers and clubs. Between the “eolith” and the coup-de-poing there is a “hiatus” which has to be filled up by intermediate forms and phases of workmanship—the products of a manipulating hand guided by intelligence. If eoliths are to be accepted as the deliberately shaped tools of earlier races there is no objection to, or improbability in, dating them to a very remote period, even to preglacial times. Among the more noted investigators in this department of research may be mentioned the Abbé Bourgeois, who, in 1867, discovered eoliths in the upper Oligocene beds near Thenay (Loir et Cher); M. J. B. Rames, who first detected them in the upper Miocene beds of Puy Courney (Cantal); and MM. Munck and Rutot, who profess to have unearthed the Eolithic industry in the middle Oligocene of Belgium. Many other anthropologists are busy in this obscure field of research. But we cannot pause to look into these interesting discoveries, as we have still more important problems ahead, which, being nearer our own times, have more human interest to us than these very remote speculations.

M. Boule, the distinguished Professor of Palæontology at the Natural History Museum in Paris, makes the Moustérien the first, or lowest, of three epochs into which he divides the upper Quaternary deposits. This mode of classifying the remains of the Palæolithic races of Europe is, to my mind, the best standpoint from which to discuss the evidence of their cultural attainments. Before the Moustérien epoch,

man was a mere animal with social organisations little above those of his simian ancestors. Now, for the first time, were laid the germs of human institutions founded on the lines of practical utility. When the exigencies of climate compelled the river-drift men to seek shelter in natural caves they unconsciously took the first steps in founding the *Home* and *Household menage*. Clothing the person became a necessity to prevent its being frozen up. The disappearance of subtropical fruits made hunting their principal means of livelihood, and cooking the flesh of these animals became a recognised domestic duty. During this epoch their stock of tools and manufactured accoutrements necessary for their daily avocations were greatly increased, both in number and variety. The coup-de-poing was almost entirely discarded, and its place taken by a large flake, worked at first only on one side, known in recent times as *le grand éclat Levallois*. "It is," says M. Commont (*Congrès Préhist. de France*, 1909, p. 130), "especially large and thick. It is not rare to find flakes measuring 15 to 18 centimetres (6 to 7 inches) in length and 2 to 5 centimetres in thickness at the heel-end (Pl. III., No. 3). It is the inferior type in the Moustérien levels of Montières which has been found in the lower rolled gravels on the brink of the river. We find the type of Saint Acheul at the base of the *ergeron*, and in certain of the plateau stations (Beauval, le Boisiere, Caix en Sauterre, Fitz-James) associated with coups-de-poing." The title of M. Commont's instructive paper is "L'Industrie Moustérienne dans la Region du Nord de la France," and in it he describes and figures a number of the "Levallois flake." It is the typical implement in the cave of le Moustier, and some excellent specimens from it are figured in *Reliquiæ Aquitanicæ*. As a workable tool the "Levallois flake" was an improvement on the coup-de-poing, presenting a sharper cutting edge and requiring less labour in its manufacture. Along with it in the Moustérien stage of culture were saws, scrapers, lance-points, all of which were utilised in carrying on the work of the establishment.

In 1906 Dr Henri Martin discovered among the Moustérien débris in the station of La Quina (Charente) several portions

of the long bones of the horse, bison, and a large species of deer, showing marks of human workmanship, so that already the advantage of using this material (and probably horn as well) for the manufacture of implements had been recognised by the troglodytes (*Bull. Soc. Préhist. de France*, 1906, p. 155; *ibid.*, 1907, p. 47).

Since Dr Martin drew attention to the presence of bone implements at La Quina, M. E. Pittard (*R.E.A.*, 1907, p. 429) and M. A. Favraud (*ibid.*, 1908, p. 46) have described the occurrence of bone objects at the stations of Rebières (Dordogne) and Petit Puymoyen (Charente), both assigned to the Moustérien epoch.

The Neanderthal-Spy race inhabited a large portion of Central Europe extending westwards to Britain and the Iberian peninsula, as well as some adjacent lands, now submerged in the North Sea and English Channel, but which in those days were splendid feeding-grounds for a number of edible animals, for Britain then formed part of the Continent. These primitive inhabitants lived as isolated family groups, no doubt thinly spread over this wide area; but after the severity of the climate forced them to seek covered protection, the localities in which caves and rock-shelters were most abundant would become permanent places of abode. From this point of view the Dordogne was one of the most favoured districts, and it would appear that it had been continuously inhabited by the Palæolithic people till the reindeer disappeared from Central Europe.

On the Aurignacien epoch I have little to add to the remarks made in Chapter II., except to note the masterly activity and wealth of detail with which the Abbé Breuil has differentiated its characteristic remains. The controversy on this epoch, waged between himself and M. Ad. de Mortillet—both combatants so competent with pen and pencil—repays perusal for the insight one gets into the points of resemblance and difference of the disputed objects.¹ The sum and substance of the whole matter is that, in the course of industrial progress, some of the new tools and new materials for their manufacture,

¹ See Ad. de Mortillet, "La Grotte du Placard et le niveau d'Aurignac," *Congrès de Lyon*, 1906, and *Congrès Préhist. de France*, 1907; l'Abbé Breuil, "La Question Aurignacien," *Revue Préhistorique*, 1907 and 1909.

which were formerly regarded as belonging to the Solutrén, were now ascertained to have been invented and used in pre-Solutrén times (Pl. V.). M. Piette's Eburnean figurines found at Brassempouy and other Pyrenean caves, first started the Aurignacien controversy, as the investigator, on stratigraphical grounds, placed them earlier than the Solutrén Age. Subsequently, similar figurines were found in the Grimaldi caves and several other localities in Europe. Then came the Abbé Parat's discovery of an engraved woolly rhinoceros (Fig. 13) on a bit of stone in the Trilobite cave, as already described (see p. 48), which showed that the art of engraving must also be relegated back to the Aurignacien epoch. The date of engraving and painting on cavern walls is more difficult of determination; but, nevertheless, evidence is not wanting on this point, for on clearing out the débris in the cave of Pair-non-Pair, it was found by M. Daleau, the discoverer and explorer of the cave (*Les Gravures sur rocher de la Caverne Pair-non-Pair*, Bordeaux, 1897), that the deposits had partly covered the wall figures, and that consequently these figures were at least as old as the lower strata of the débris. Subsequently, M. Breuil proved that that portion of the débris was Aurignacien ("La Question Aurignacienne," *Rev. Préhistorique*, 1907). Among the fourteen figures in this cave one or two had traces of red paint; and among the upper layers M. Daleau discovered several lumps of peroxide of iron, bruisers made of quartz and granite, and a palette for mixing colours. This, of course, proves that the origin of the art of painting, like that of engraving, dates back to the Aurignacien Age. But it remained for M. Breuil to settle the business on a basis of practical research, by bringing into court evidential materials too overwhelming to leave the matter any longer in doubt.

In the concluding remarks of his *Epilogue d'une Controverse*, he thus writes:—

"At the end of this second memoir on the pre-Solutrén Age of the industry, or rather successive industries, of the Aurignacien, we will cast a retrospective glance on the path pursued. It is no longer only the eight stations of Ferrassie (Dordogne), Pair-non-Pair (Gironde), Brassempouy (Landes), Solutré (Saône-et-Loire), Arcy-sur-Cure (Yonne), Spy, Pont-à-Lesse et Goyet (Belgium), in which stratigraphy confirms the theories of Lartet, Dupont, and Piette, and now

adopted by me after being defended by E. Cartailhac. Since two years the stations of the Roc de Combe-Capelle, of Rut, of Laussel (Dordogne), of Planchetarte (Corrèze), of Roc de Sers (Charente), of Sirgenstein et de Ofnet (Germany) have furnished evidence in support of the same view. Several stations in Spain appear to have given similar results. We may therefore conclude that to place the stratigraphical position of the Aurignacien between Moustérien and the Solutrén is one of the most certain chronological facts of the upper Palæolithic Age, and that few sequences rest on such a body of precise observations."

When the term Solutrén was first adopted it applied to the superficial hearths and débris of the reindeer age, containing objects made of flint and bone; and also included burials placed over the hearths, which, however, turned out to belong to different ages, some being even as late as Gallo-Roman times (see p. 52). But the results of the more recent excavations have disclosed, below the magma of horse-bones, characteristic remains of both the upper and the lower Aurignacien culture.

The special features of the Solutrén stage of culture, after being shorn of its Aurignacien deposits, are first of all, a marked advance in the manufacture of flint implements, as disclosed by the beautiful workmanship on the so-called laurel-leaf and willow-leaf lance-heads, which show flaking almost as fine and delicate as that on the sacrificial knives of Egypt (Pl. VI.). The fine chipping on these weapons could not be produced by the ordinary method of hammering, however great the workman's skill may have been, so that the artists of the period had already experience in doing this work by pressure. An equally characteristic object is the willow-leaf point (*pointe à cran*) (Pl. VII., Nos. 10, 11), which has one side of the hilt cut away, leaving a tang-like appendage. Another distinguishing feature in the culture of the inhabitants of Solutré was their predilection for horse-flesh, as shown by the extraordinary quantity of the bones of this animal found among the débris of the habitation. Although the reindeer was largely represented it was not in point of numbers anything like the former—a peculiarity which was reversed in the succeeding Magdalénien epoch.

Sculpture on stone was practised, as shown by the finding of four quadrupeds carved out of limestone pebbles, one of which is here reproduced (Pl. VI., No. 15) after *Musée Préhistorique*,

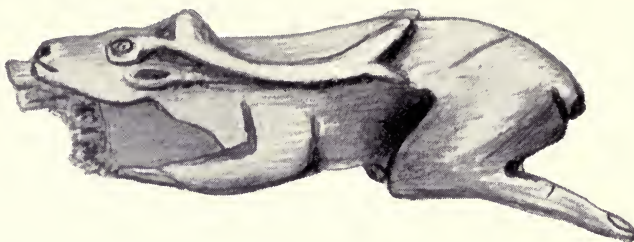


FIG. 1.—Handle of a Dagger sculptured in Ivory into the form of a Reindeer ($\frac{2}{3}$). Rock-shelter of Bruniquel.

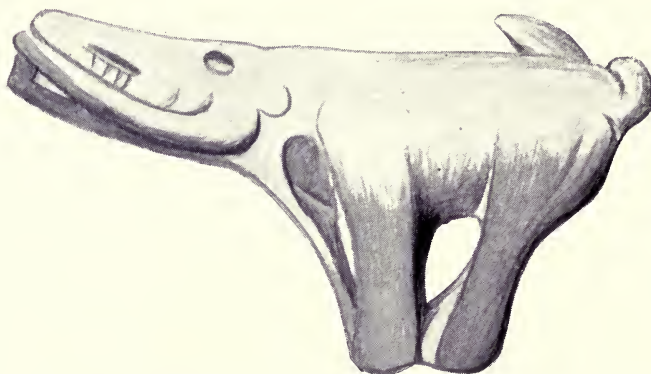


FIG. 2.—Mammoth sculptured in Reindeer-horn ($\frac{2}{3}$). Rock-shelter of Bruniquel.

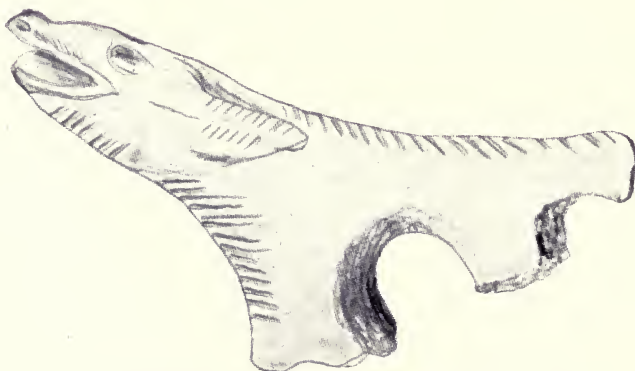


FIG. 3.—Unknown Animal sculptured in Reindeer-horn ($\frac{1}{4}$). Laugerie Basse.

Animals sculptured in Ivory and Horn.

[To face p. 209.

pl. xix.¹ The art of engraving on bone was known but apparently little practised. From the lumps of pigment and ochre occasionally met with on the hearths, it is supposed that painting was carried on to some extent. Bone needles were also for the first time found in the upper strata.

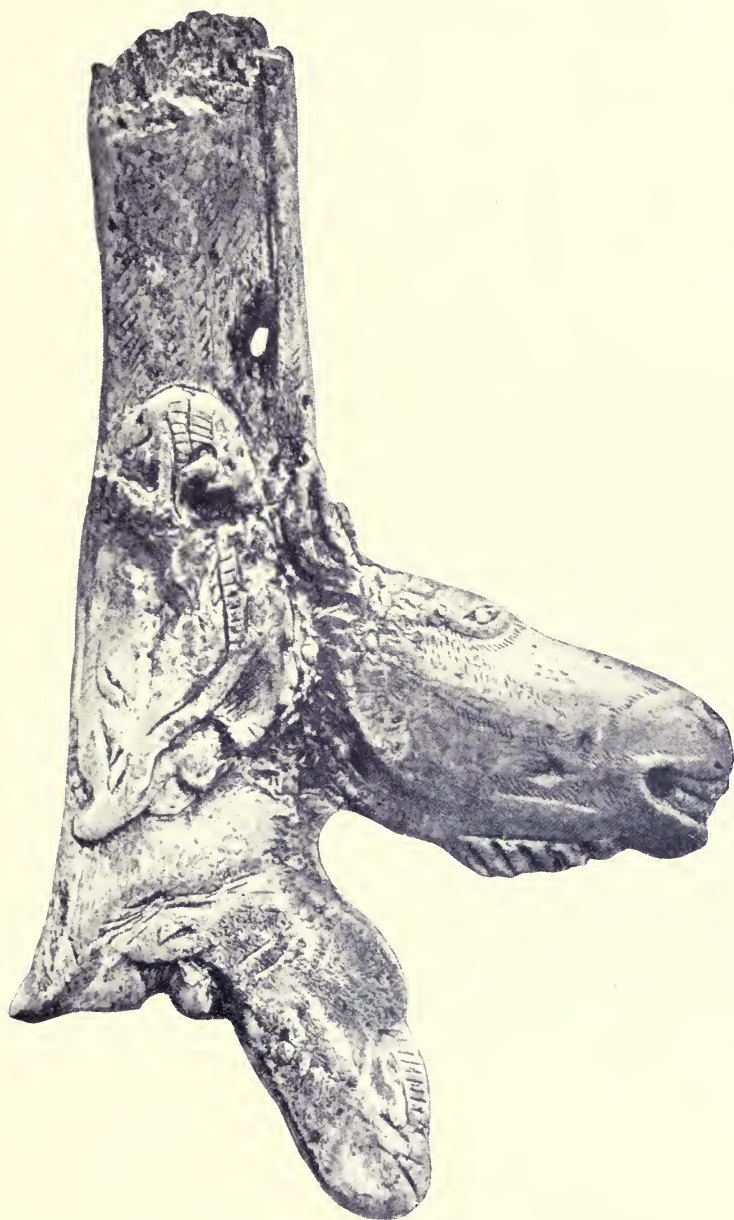
The characteristic laurel-leaf lance-heads and *pointes à cran* have been found in several other stations, such as Lacave (Lot), explored by M. Armand Vire. In 1873 some magnificent specimens of the former were found at Volgu (Saône-et-Loire), in the form of a concealed hoard, supposed to be for votive purposes as they were too thin and fragile for ordinary work. This view was considerably strengthened by an observation of Breuil, who ascertained that one of the blades, which disappeared at the time of the discovery, but ultimately was sent to the Museum of Lyon, had been completely covered with red ochre—a fact which undoubtedly suggests a votive offering (*Bulletin de la Diana*, vol. xv., 1908). The hoard contained fourteen specimens, measuring from 9 inches to 14 inches in length; the largest of those, still unbroken, is shown on Pl. VI., No. 16.

In the débris of Magdalénien stations are to be found the perfected results of the application of mechanical principles to the improvement of the tools and implements requisite for the accomplishment of man's daily avocations, now so greatly extended. His principal occupation was the chase, the produce of which constituted his staple food, and to capture the big game of his neighbourhood in sufficient quantity entailed the use of a variety of new weapons. One characteristic feature of this age was the practical knowledge that bone, ivory, and reindeer-horn were better materials for the manufacture of piercing implements than flint. Hence the rapid disappearance of the laurel-leaf blades, which gave place to a series of improved weapons in bone and horn—daggers, long, polished cylindrical lance-heads, barbed harpoons, and quite a number of small dart-points, to be affixed to light wooden shafts as shown on Pl. VIII. The new lance-heads thus requisitioned consisted of flat or conical rods, pointed at the distal end, and adapted at the other for attachment

¹ For references to the literature of Solutré, see *Déchelette*, vol. i., p. 133.

to the shaft by several mechanical processes. Sometimes the proximal end had a wedge-shaped slit into which the shaft penetrated—an enlarged example of the typical Aurignacien point (Pl. V., Nos. 1-7). This process was sometimes reversed by making the slit in the shaft. In other cases the attached end of the lance-head terminated in a long, slanting splay, so as to be spliced with a corresponding one in the shaft (Pl. VIII., Nos. 13, 14). Others had the proximal end terminating in a blunt cone (Nos. 1-4), so as to form a loose joint—in which case the blunt end of the head had either a circular ridge, or two projecting lobes, or a small perforation placed a little above the cone, which served for the attachment of a string when the head was intended to remain in the hunted animal's body. When spearing salmon the string was attached to a float which indicated the position of the fish after death. These arrangements were perhaps more applicable to the barbed harpoons, of which so many beautiful specimens were found by Lartet and Christy on the Magdalénien stations of the Dordogne. Certain cross striæ, often to be seen on the slanting proximal ends of the earlier lance-points, are supposed to be owners' marks (*marques de chasse*). Some of these barbed harpoon and dart-points are so small as to be sometimes described as arrow-points; but there is no evidence that the bow was known to the Palæolithic people. Besides, if arrow-heads of flint had been used there is no reason why they should have been abandoned for those made of bone or horn. That the former were more suitable as arrow-tips than the latter is proved by their survival into historic times. The bow, if it had been used in Palæolithic times, would have been made of wood, and few, if any, objects of that material have survived the process of natural decomposition. No spear-shafts, handles, dishes, clubs, mallets, or worked timbers of any kind have been recorded among the relics of Palæolithic man; but yet wood must have been largely utilised for all these purposes. Among the objects illustrated on cave walls are wooden erections of some kind. (See Fig. 84.)

Both spears and harpoons were thrown by the hand, but this action was sometimes assisted by an apparatus called



Portion of Reindeer-horn from Mas-d'Azil, sculptured into two Horse-heads (Col. Piette).
(After E. Cartailhac in *La France Préhistorique*.)

by French writers *propulseur*, or spear-thrower, an example of which is figured on Pl. IX., No. 8. This was used for throwing darts and the smaller lances. It consisted of a stick made from the beam of a reindeer horn, with a notch at one end in which the butt end of the lance rested. In discharging the weapon the operator manipulated with his fingers in such a way as to give a greater impulse and a better direction to the lance than if he merely threw it with the hand.

Among daggers are a few having the hilt sculptured in the form of an animal, fantastically adapted to suit the hand, of which the famous reindeer-hilted one from Laugerie Basse is one of the finest examples of the art of the Magdalénien epoch (Pl. VIII., No. 29).

Other two fine specimens are from the station of Bruniquel, one representing a reindeer and the other a mammoth, but having no blade they are claimed as idols (Pl. XVI., Nos. 1, 2). No. 3 on the same Plate represents the head of an unknown animal, but it is evidently the top portion of a *bâton de commandement*. Besides a few human figurines, which will be noticed later, there are some specimens of sculpture in ivory and reindeer-horn which are truly astonishing works of art. For instance, the figurine of a horse made of ivory from the Grotte Espelungues (Basses Pyrenées, Pl. XX., No. 1), portion of a reindeer-horn from Mas-d'Azil sculptured into two horse-heads (Pl. XVII.), and the bridled head of a horse from Saint-Michel d'Arudy (Fig. 65).

That mysterious, but often highly ornamented object, the so-called *bâton de commandement*, though known in the Solutréen Age, was only now met with in sufficient numbers to be regarded as an object of utility. Excellent examples of this supposed badge of distinction are the *bâton de Montgaudier*, having salmon engraved on one side and eels on the other (Pl. XVIII.); that showing a human figure with horses, a serpent, and some kind of wooden fence, and that with horses in sequence, both the latter specimens being from La Madeleine (Pl. XIX.). On Plate XX. is figured a very remarkable form (No. 2), having its upper end carved into a spiral. Another (No. 3), terminates in the head of a bull and of a cow. No. 4 represents a whistle made of a phalangeal

bone of a reindeer's foot. Among the works of art from the Collection de Vibraye are some very interesting forms of the *bâton de commandement*, notably two here reproduced from Cartailhac and Breuil's article on the subject (*L'Anth.*, 1907). They are both ornamented with figures in semi-relief.

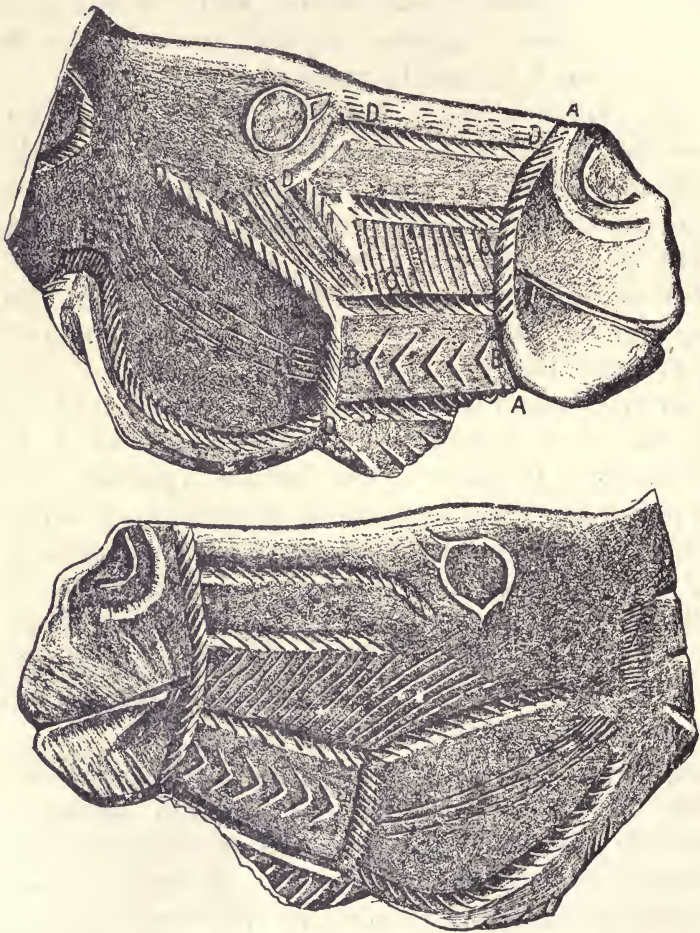
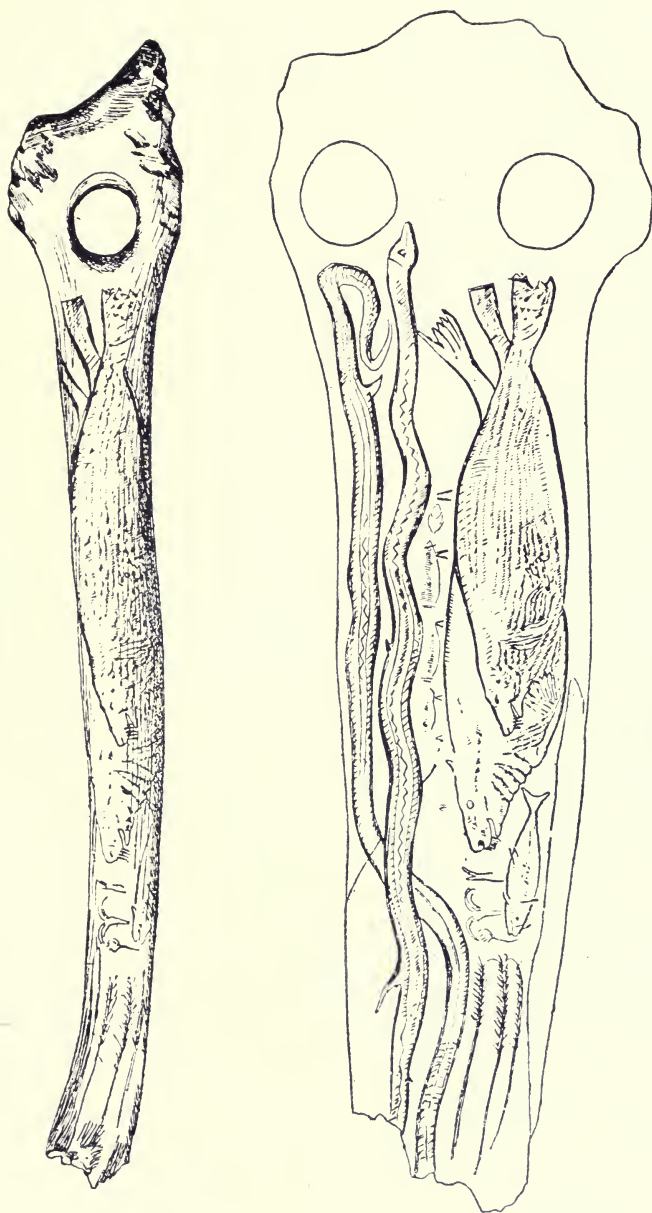


FIG. 65.—Two views of the Head of a bridled Horse, from Saint-Michel d'Arudy.
(After Piette, *L'Anthropologie*, 1906.)

One (Fig. 66) has the top broken off through the perforation, but the body bears on its surface, on opposite sides, the tail of a fish, and between them two elliptical figures adorned with slanting lines. Below the fish tail there is a horse's head on each side, one looking upwards and the other downwards. The interesting feature of this ornamentation is that the fish



Bâton de Montgaudier. (Collection Pognon.)



tail (*queue de poisson*) has been found elsewhere as an "amulette" perforated for suspension. That the *queue de poisson* on this bone had a similar motive is strongly suggested by the fact that both show a hollow which can only be meant for a perforation. The other *bâton* (Fig. 67) is perfect, and terminates at the handle end in a blunt point. The head is ornamented with a series of notches, and the body, below

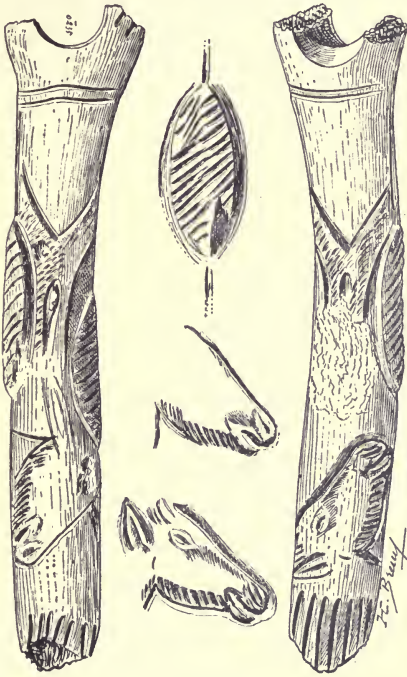


FIG. 66.—Portion of a Bâton de Commandement, ornamented with horse-heads, and an Amulet in the form of a fish-tail ($\frac{1}{3}$). (After Cartailhac and Breuil, *L'Anth.*, 1907.)

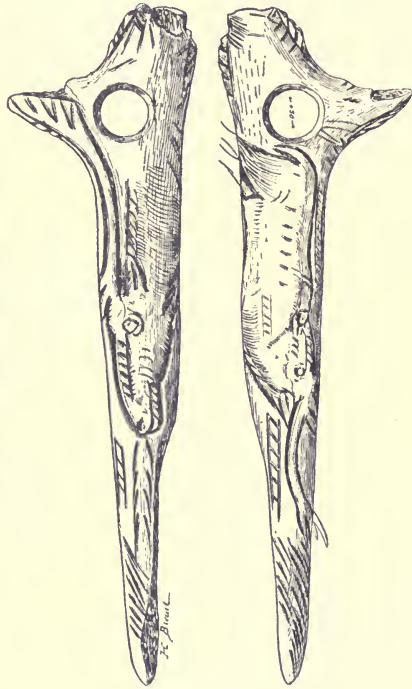


FIG. 67.—Bâton de Commandement, with stags ($\frac{1}{3}$). (After Cartailhac and Breuil, *L'Anth.*, 1907.)

the perforation, with the figures of two deer—one being in the attitude of galloping.

Various opinions are held as to the real purpose of the so-called *bâton de commandement*. Some regard it as a magic stick, others that it is part of a horse's bridle, and others that it is a kind of fibula for fastening skin garments. Some of them, especially those with several holes of different sizes, may have been used as arrow-straighteners, a view suggested by Professor Boyd Dawkins (*Cave Hunting*, p. 355).

With regard to the multiplicity of manufactured objects now requisite for the management of the establishment, a selection of the raw material was made for special purposes, thus proving that the operators had a practical knowledge of the respective qualities of bone, horn, ivory, and flint. For this reason needles were always made from the surface of a long bone, the cannon of a horse's leg being generally preferred for this purpose. Long slender portions were cut out of the bone by sharp flint instruments. The eye was made by scraping a small hollow near one end, and a similar one on the other side just opposite the former, and worked until the two met. The perforation thus effected had the characteristic of being narrow in the middle and opening out into a conical

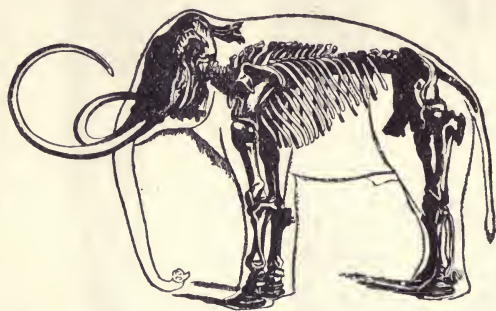


FIG. 68.—Skeleton of the Mammoth found in Siberia in 1799, now in St Petersburg.

expansion on both sides. Hence, a needle offered for sale having a bored hole would be at once pronounced a forgery. After the eye was made the needle was rubbed smooth and polished. Ivory was equally good, but latterly this was becoming a scarce commodity. Spears and harpoons were made of reindeer-horn because of its solid consistency—long bones being unsuitable on account of being hollow in the centre. Some of the smaller lance-heads only were made of bone. Flint for cutting purposes retained its superiority over all other materials till the invention of bronze.

The art of engraving on plaques of bone, ivory, and stone now became so common that there was hardly a manufactured tool or handle but was adorned with figures of the contemporary fauna, especially the animals that were hunted for food—horse, reindeer, auroch, goat, mammoth, etc. In this category comes



A.—Human Figure, Horses and Serpent (?) ($\frac{1}{3}$).



B.—Horses in sequence ($\frac{1}{2}$).

Two Bâtons de Commandement from La Madelaine.

the famous relic in the form of a piece of ivory from the outside layer of the tusk, having incised on it the outline of a hairy elephant (Pl. XXI.). The lofty skull and hollow forehead of

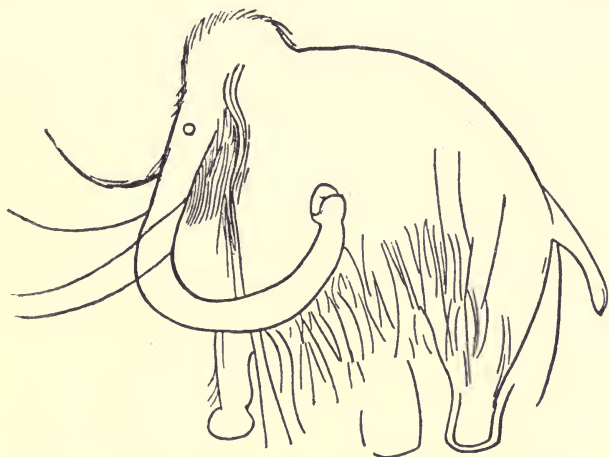


FIG. 69.—Incised figure of Mammoth in Cave of Combarelles.
(After Capitan and Breuil.)

the animal are characteristic of the Siberian mammoth, as shown by its skeleton preserved in St Petersburg (Fig. 68). Also, on comparing it with the spirited outline of the mammoth

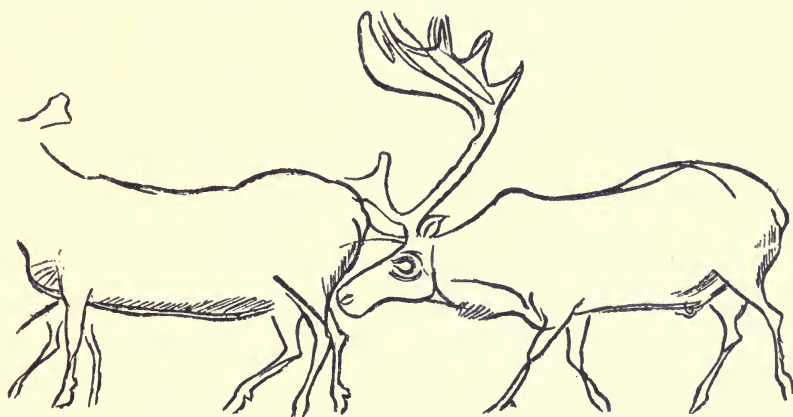


FIG. 70.—Reindeer incised on a Plaque of Schist.
(After Cartailhac and Breuil, *L'Anth.*, 1907.)

incised on the wall of the Cave of Combarelles (Fig. 69), one cannot fail to be struck with the striking resemblance between them.

A plaque of schist ornamented with the classic engraving

known as the "Combat de Rennes" is from Laugerie Basse, (Fig. 70) here figured after Cartailhac and Breuil (*L'Anth.*, 1907). In the British Museum there is a series of sandstone pebbles having bovidæ, apparently of different species, incised on them (Fig. 71). They were found in one of the rock-

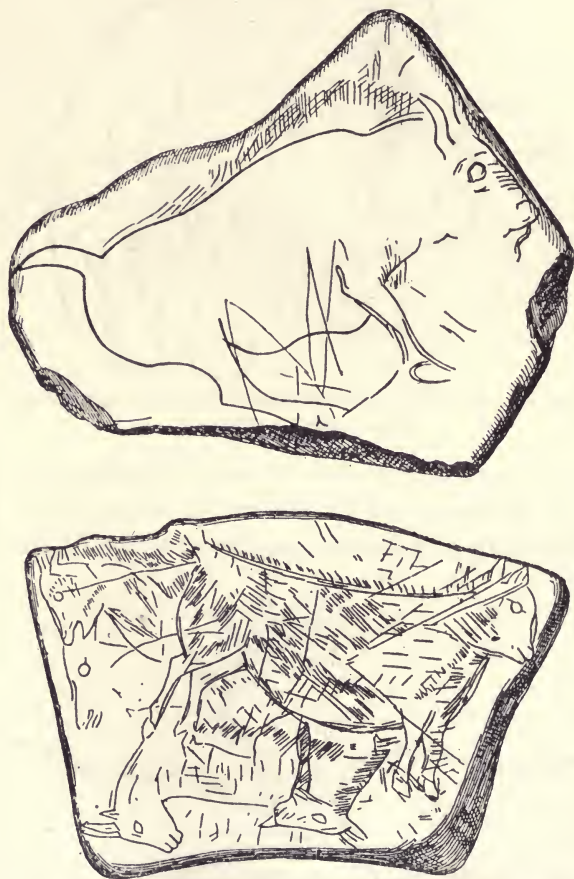


FIG. 71.—Bovidæ incised on two Stones from the Rock-shelter of Bruniquel (3).
(After British Museum Catalogue.)

shelters of Bruniquel explored by M. Peccadeau de l'Isle, whose rich collection passed to the British Museum in 1887, and contained three famous relics, viz., two reindeer sculptured in ivory and a mammoth in reindeer-horn (Pl. XV., 1, 2).

The manufacture of so many and varied weapons for the chase alone constituted a new industry, which in turn entailed a rearrangement in the flint industry. What was now wanted

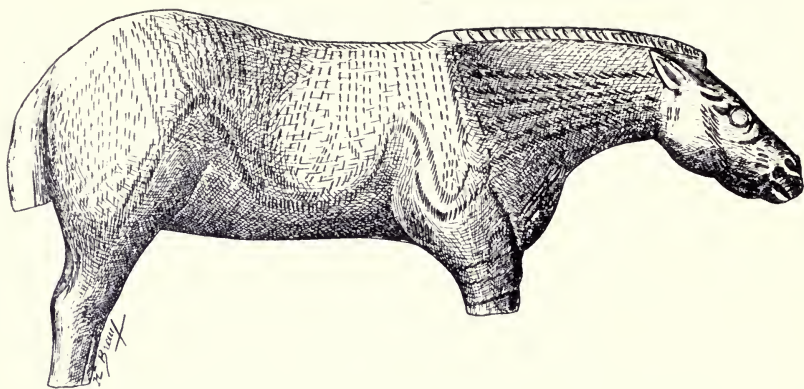


FIG. 1.—Figure in Ivory, Grotte des Espélungues de Lourdes.
(After Piette in *L'Anth.*, xiii.)

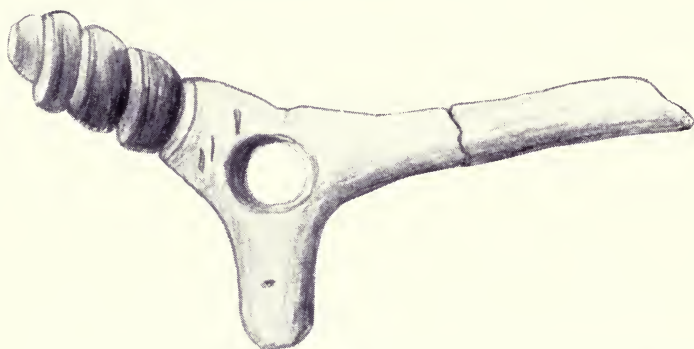


FIG. 2.—Bâton de Commandement from the Cave of Placard (Col. de Maret) ($\frac{1}{2}$).
(After *M.* *Préhistorique.*)

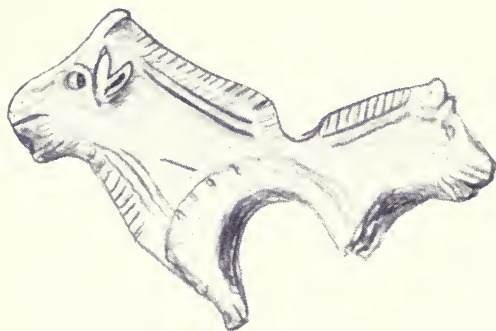


FIG. 3.—Portion of Bâton de Commandement,
Laugerie Basse ($\frac{1}{2}$).
(After Girod et Massénat.)



FIG. 4.—Bone Whistle,
Laugerie Basse ($\frac{1}{2}$).

A Horse carved in Ivory, and other objects on Reindeer-horn.



Mammoth engraved on a piece of Ivory ($\frac{1}{2}$). (E. Lartet.)

was better cutting implements for minute working in bone, horn, ivory, and wood. Hence the flint factories put out fewer of the larger implements and more of the small, sharp, cutting and piercing tools, such for example as could be used in boring the eye of a needle. The domain of art—sculpture, engraving, and painting—assumed a wider range, embracing not only the manufacture of small plaques with miniature figures, but the decoration of the walls of inhabited caves with sculptured friezes and life-size paintings of animals, illustrating sometimes with a masterly hand the habits, ways, and peculiarities of the fauna of the period. All these operations required for their proper execution an assortment of special tools.

In domestic economy there is evidence that they boiled or roasted the flesh of the captured animals and utilised the skins as garments. Possibly some round pebbles abundantly met with in the kitchen débris might have been used as “pot-boilers.” A few stone mortars and pestles (Pl. VII., No. 14) which occasionally turned up would appear to have been used only for mixing colouring matter, either to paint their bodies or the walls of the caverns they frequented. Tailoring was extensively practised in making skin garments; and the needles, pins, buttons, etc., as well as the small flint instruments used for such fine work are abundantly represented. Their ornaments consisted of perforated teeth, shells, and pendants made of various materials.

The number and variety of artistic objects found in the débris of Magdalénien sites, together with the discovery of large engravings, paintings, and sculptured friezes, on the walls of the caverns they frequented, testify to their skill in the execution of real works of art. Of this artistic phase in the history of the Palæolithic people we shall now give a brief description.

Wall Pictures.

The caverns adorned with wall pictures in the form of engravings, sculptures, and paintings in various colours number about thirty, nearly all of which are situated in the south-west of France, the Pyrenees, and the north of Spain. They all belong to one phase of art which appears to have been practised for a long time. Although there are indications that

the dawn of painting dates as far back as the Aurignacien Age, there can be no doubt that polychrome painting was the last phase in the evolution of Palæolithic art. M. Breuil has shown that in caverns with pictures of long standing a chronological sequence in the progressive stages of art can be established, by observing the superposition of one figure above another. But however this may be, it is now generally admitted that ultimately engraving on cavern walls became subservient to painting in colours and freehand drawing.

As it would be impossible within our present limits to notice the special features of all these ornamented caves, we shall select for descriptive purposes one or two of the best known examples. The first cave in which mural paintings were observed is that of Altamira, near Santander, in the north of Spain. In 1879 Don Marcelano de Sautuola, a Spanish nobleman living in the neighbourhood, while one day searching in the cave for the usual Palæolithic implements, was surprised to find that the roof of one of the chambers was covered with a crowd of polychrome figures, representing different kinds of animals in various sizes and attitudes, the largest being apparently life-size. These pictures, some thirty in number, were so well executed that the different species of animals could be readily distinguished. M. Sautuola forthwith published an illustrated brochure on his discoveries (1880), modestly giving his opinion that these designs were the work of the Palæolithic hunters. But the subject seemed so improbable at the first blush that it was received with profound scepticism. M. Vilanova y Piera, Professor of Palæontology in Madrid, visited the cave and strongly advocated, but in vain, the contemporaneity of the mural figures, hearths, and other Palæolithic remains of the cave. On the other hand M. Ed. Harlé, an engineer, also visited the cave and wrote an article against the antiquity and authenticity of the pictures (*Matériaux*, 1881, p. 257), notwithstanding that he actually recorded a fact which, at least, might have moderated his hostile criticism, viz. that some of the paintings were covered with a layer of stalagmite. Seeing that the existence of the cave was not known till 1868, when it was accidentally discovered by a hunter—the original entrance having been blocked by a mass of fallen débris—one might

have thought that this was too short a time to admit of the deposition of stalagmite over modern figures. In the polemical discussions which followed, archæologists of the highest standing failed to appreciate for a time the true value of the Spanish discovery ; so that, like the discovery of M. Boucher de Perthes, it remained discredited for several years. But futurity has many curious things in its wallet.

About the same time M. Chiron observed a complexity of linear incisions in the cave of Chabot (Gard), which were subsequently (1901) recognised by M. Capitan to be figures of animals. In 1895 M. E. Rivière read a paper at the Academy of Sciences, stating that engravings of animals were to be seen on the walls of the cave of La Mouthe (Dordogne), and in the following year M. Daleau announced that similar engravings were deeply cut on the walls of Pair-non-Pair (Gironde).

It was not, however, till September 1901, when MM. Capitan and Breuil submitted joint notices to the Paris Academy of Sciences of the discovery of engravings and paintings of the Palæolithic period in the caves of Combarelles and Font-de-Gaume (both in Dordogne), that cautious archæologists, such as Cartailhac and Boule, announced their belief in the authenticity and genuineness of these very remarkable mural pictures. At last M. Sautuola had his reward. The upshot of the harmony which now prevailed was that the scientific exploration of Altamira was undertaken by MM. Cartailhac and Breuil. Among the results of their investigation was a comprehensive report published in *L'Anthropologie* (vols. xv. and xvi.) under the title of "Les Peintures et Gravures Murales des Cavernes Pyrénéennes—Altamira de Santillane et Marsoulas." This excellent article has since been expanded by the authors into a voluminous and highly illustrated monograph. Before, however, dealing further with Altamira we shall briefly notice the earlier discoveries of M. Rivière in the cave of La Mouthe, and of MM. Capitan and Breuil in the caves of Combarelles and Font-de-Gaume.

La Mouthe.

The exploration of La Mouthe has been conducted under M. Rivière at various periods since 1895 (*Bull. de la Soc.*

d'Anthrop., 3rd June, 1st July, 4th and 18th November 1897, 19th October 1899, and 17th October 1901), with the happiest results. It seems that about fifty years ago the cave, then presenting an open recess facing south, and extending some 12 metres inwards, had been formed into a kind of storeroom by building a wall in front, leaving only a door for access. Its contents, including, it is said, decayed bones and flint implements, had been utilised as manure. In April 1895 it was ascertained, for the first time, that the cave was not limited to the space occupied by the storeroom, as, on clearing out a small portion of the débris still remaining at its inner end, a

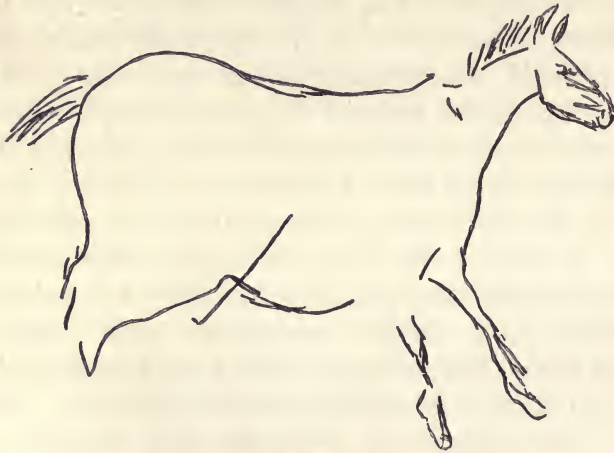


FIG. 72.—Sketch of Horse engraved on the Wall of the Grotte de La Mouthe.
(After Rivière.)

semicircular opening 0.37 metre in height and 0.62 metre in breadth was discovered. This passage led into wider expansions for some 220 metres farther. It was on the walls of this inner portion that the engravings now under consideration were detected. On 17th October 1901, M. Rivière laid before the Anthropological Society correct drawings of some of these wall decorations, clearly representing the following animals, viz., bison, bovidæ, reindeer, goat, mammoth, and two equidæ. The figures of the two horses were incised on a panel 128 metres from the entrance. The first (Fig. 72) represents an animal with a small head, slender neck, and well-formed fore-quarters; but the posterior half is heavy and altogether out of proportion. The other (Fig.

73) has a stout neck, a long head directed almost vertically, and a hairy chin. Whatever may have been the defects of the artists, the originals of these two drawings must have been different species of horses.

With regard to the authenticity of these rock-engravings, M. Rivière has successfully dispelled misgivings on this score by showing, among other evidence, that the figures were partly covered by the débris accumulated in the cave; "Cependant ils se prolongeaient aussi sous l'argile rouge qui constitue le sol de la grotte, à partir d'une certaine distance de l'entrée, et dont le niveau supérieur dépasse généralement l'extrémité des pattes des animaux gravés" (*ibid.*, vol. viii., 4th series, p. 314). M. Rivière has also shown that the cave had been occupied by man both in the Palæolithic and Neolithic periods, the two strata being separated "par une stalagmite plus ou moins épaisse." Among the Neolithic débris were fragments of coarse pottery, and bones of various animals, including the horse, stag, and a small-sized ox.



FIG. 73.—Head of a Horse (Grotte de La Mouthe). (After Rivière.)

Combarelles.

The Cave of Combarelles is situated in the valley of the Beune, within walking distance of Les Eyzies and Font-de-Gaume (see Fig. 31). It is supposed to be the dried bed of a former subterranean stream, and extends, in the form of a serpentine tunnel, to 234 metres in length, with an average breadth of 1 to 2 metres, and a height of 1.60 to 1.75 metres. Only exceptionally does the height reach, or go beyond 2 metres, but sometimes it sinks so low that one has to creep to get along. The floor and roof are occasionally so much encrusted with stalagmitic deposits as to modify the original height considerably, but the walls are rarely covered with more than a film, which in some parts is absent altogether. The engravings begin at a distance of 118 metres from the entrance, and are continued on both sides, with only slight intervals, for 100 metres to within a few yards of the terminal end of

the cavern. The average breadth of these tableaux is 1.50 metres. When the reduced drawings were completed and extended on paper, we are told that they formed a band 12 metres in length and 10 to 12 centimetres in breadth. The lines delineating some of the figures are incised up to a maximum depth of 5 to 6 millimetres, and over them the stalagmitic film sometimes attains such a thickness as to completely mask the design. On the other hand, the incised lines are occasionally made more conspicuous by the addition of a thin band of black paint. The figures represent animals in various attitudes, and the designs both in technique and execution strongly remind one of the art of the reindeer-hunters of La Madeleine and other stations of the later Palæolithic period.



FIG. 74.—Sketch of a portion of the Wall of Combarelles, showing different animals.
(About $\frac{1}{10}$ natural size.)

The total number of animals outlined, so far as they could be distinctly made out, is 109 : animals entire but not identified,

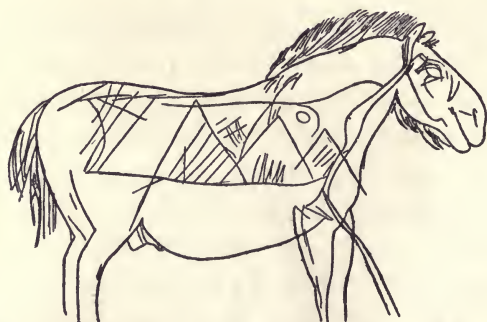


FIG. 75.—Engraving of a Horse with supposed Cover ($\frac{1}{10}$).

19 ; equidæ, 23 ; bovidæ, 3 ; bison, 2 ; reindeer, 3 ; mammoth, 14 ; heads of goats, 3 ; heads of antelopes, 4 ; heads of various animals, chiefly horses, 36 ; human face, 1 (?) ; cup mark, 1. These engravings, of which Figs. 74 to 77 are specimens,

betray so much artistic skill, precision of details, and knowledge of animal life, that MM. Capitan and Breuil regard them as



FIG. 76.—Reindeer incised on wall of Combarelles.

equivalent to precise documents in Palæontology. Equidæ being the most frequent of all animals figured in this cave, no



FIG. 77.—Figure of a Wild Goat on the wall of Combarelles.
(The last four figures are after Capitan and Breuil.)

less than forty illustrations, representing at least two species, having been accurately deciphered, archæologists will be greatly interested to know what the explorers regard as the differential

characters of these two species of horses. As this point is important, I will quote their exact words :—

“On peut nettement distinguer au moins deux espèces très différentes. Les uns sont de gros chevaux, à crinière ordinairement droite, à queue très fournie, à grosse tête et nez busqué avec lèvres très fortes.

“D'autres sont beaucoup plus élancés, plus fins ; la tête est petite, la crinière, également droite et courte, arrive jusque sur la tête qui est notablement plus petite, le nez paraît bien plus droit que chez les précédents, enfin la queue est implantée tantôt plus bas, tantôt au contraire plus haut, comme celle des bovidés ; elle est glabre, souvent terminée par une touffe de poils.” (*Rev. de l'Ecole d'Anthropologie*, 1902, p. 39.)

Since the characters of the two kinds of horses, as described in the above extract, are in keeping with the more or less precise evidence to the same effect gathered from other stations of the same period, they may be at once accepted as correct.

Font-de-Gaume.

The Cave of Font-de-Gaume is situated in a small side valley opening into the valley of the Beune, from which it is distant about 300 metres, and a little over a mile to the west is the famous station of Les Eyzies (see Fig. 31). The entrance, which is half-way up a cretaceous slope, and about 20 metres above the floor of the valley, leads into a tunnel, 123 metres long, with three lateral branches. The breadth varies from 2 to 3 metres, and the height from 5 to 6 metres, but occasionally the passage becomes greatly contracted.

The animal figures begin at 65.70 metres from the entrance, in the midst of a mass of stalagmite. The first thing to be noticed with regard to the pictures in this cave is that they are entirely different from those in Combarelles. In the latter, as we have just seen, they consisted almost exclusively of engravings of the various animals, deeply cut on the face of the rock ; but in Font-de-Gaume they are real paintings in ochre, or black, or sometimes in several colours. Nearly all these paintings are outlined in fine incised lines, heightened in effect by a black-painted band. Sometimes certain parts of the animal, such as the feet or head, were painted black ; at other times the whole body was black, thus forming a true silhouette. More frequently, however, the figures outlined in black lines



FIG. 1.—Bison painted in Ochre.



FIG. 2.—Reindeer partly painted and partly incised.

Specimens of Painted Animals from the Cave of Font-de-Gaume (}).
(After MM. Capitan and Breuil.)

had the body covered with a uniform layer of red ochre. Also, in some instances, certain parts of the animal were done with a coating of black and red, thus producing a brown colour. Others again had the head or feet painted in one colour, and the rest of the body in a different one. A number of these painted figures had over and above a layer of stalagmite, varying in thickness from a few millimetres to as many centimetres.

The pictures continued along the whole length of the cave at various heights on the walls up to 4 metres, and sometimes they reached as low as the floor. The largest figure, an auroch painted entirely in ochre, measured 2.70 metres in length, and the smallest only 20 centimetres. The other figures ranged in size between these dimensions. The total number of figures observed and measured by MM. Capitan and Breuil in Font-de-Gaume were 80—aurochs, 49; indeterminate animals, 11; reindeer, 4; stag, 1; equidæ, 4; antelopes, 3; mammoths, 2; geometrical and scalariform signs, 6.

Two illustrations of the painted animals are reproduced on Pl. XXII. (*Rev. de l'Ecole d'Anthrop.*, 1902, p. 237). The first (A) represents an auroch traced on an irregular rock surface, and measures 1.50 metres in length and 1.25 metres in height. The body is painted in dark ochre, the feet and hind quarter are in a still deeper shade, and the snout is brown.

The second illustration (B) is a very striking picture of two opposing reindeer, the whole measuring 2.10 metres in length and 1.30 metres in height, but only part of it is here reproduced. The animal on the right shows particularly well the digits of the palmated tyne over the forehead so characteristic of the reindeer, and the head is engraved instead of being painted like the rest of the body. That on the left is also partly painted and partly engraved. The dorsal contour is formed of two lines, the outer being red and the inner black. Its horns are also black, while those of the reindeer are red, except the palmated tyne, which is black.

MM. Capitan and Breuil suggest that the paintings in the

cave of Font-de-Gaume belong to a later period than the engravings of Combarelles, founding this opinion on the frequency in the former of the figures of the bison, and the rarity of those of the reindeer and mammoth (*ibid.*, p. 238.)

Altamira.

This cave is situated on the summit of a hill of cretaceous rock, with the entrance facing the north, and affording peeps of the sea, from which it is distant some 3 kilometres. On

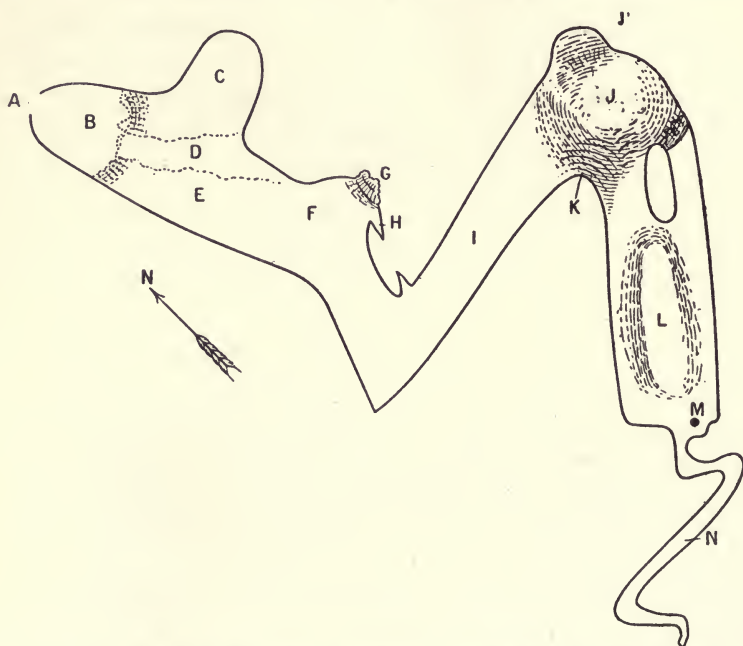


FIG. 78.—Plan of the Cavern of Altamira. (Drawn by M. Harlé in 1903.)

Total length of cavern, 280 metres. A, entrance; B, vestibule, with habitation, débris, and fallen rocks; C, chamber on left, with paintings on roof; D, fallen rocks; E, gallery on right, opening into chamber, F, from which a cascade of stalagmite, with sculptures, G, descends to the left, to the chamber H, adorned with red figures; I, gallery, with fallen rocks; J, a dome-like chamber; K, vast cascades of stalagmite; L, a navel-like chamber, communicating with J by two openings; M, a shallow well filled by later materials than the age of the pictures; N, terminal passage.

entering, there is a vestibule half-filled with fallen rocks overlying a heap of shells, broken bones, and other kitchen débris; and on the left there is a spacious chamber, 40 metres by 10 metres, described on the plan as salle "aux grandes fresques," on account of the number of figures of animals engraved and painted on its roof. The accompanying plan and descriptive references (Fig. 78) give all necessary details



View of Animal Figures on the Roof of the Grand Salle in the Cavern of Altamira (about 14 metres in length).
(From a plan prepared by MM. Cartailhac and Breuil, *L'Anthropologie*.)

of the rest of the cavern, with its chambers, stalagmite, etc. As MM. Cartailhac and Breuil restrict themselves to a description of the mural art of the cavern, it may be mentioned that in 1906 M. Alcade del Rio explored the hearths and kitchen débris in the vestibule, and discovered that they consisted of two distinct deposits—the upper Magdalénien and the lower Solutréen. In the former a portion of a bone was found with the figure of a hind engraved on it, precisely similar in style to the figures on the walls of the cave. It may also be noted that the reindeer was not represented by its bones in the débris. (*Déchelette*, vol. i., p. 256.)

Before these underground chambers were converted by Palæolithic man into an art gallery they appear to have been frequented by cave-bears, as shown by their claw-marks and polished rock-surface in places where the path was obstructed and necessitated some scrambling to get along.

With these remarks we now proceed to inspect the works of art. At the outset we are reminded that the figures were not all made in the same way, some being lightly engraved with a sharp-pointed instrument, while others were deeply incised. Some of them, however, were executed with the aid of various colouring materials, some in black and some in red; but the most perfect of all were the polychrome frescoes on the ceiling of chamber C. These the investigators have carefully copied in outline in all their intricate details, the result of which is represented in miniature on Pl. XXIII., which by their kind permission I am now able to lay before you. No wonder that, in directing attention to this great work of art, they exclaim: “Là surtout, la beauté, la dimension, la bonne conversation des peintures sont bien propres à faire naître un sentiment d’admiration et de stupeur; et certes il y a quelque chose d’émouvant à se glisser sous cette couche rocheuse abri des générations disparues témoin de leurs cérémonies et de leur vie domestique, gardien fidèle de leur art déconcertant” (*loc. cit.*, p. 629).

Passing over a series of graffiti so fantastic as to be unintelligible, we produce on Fig. 79 a number of complicated designs reminding one of the tectiform, scalariform, and

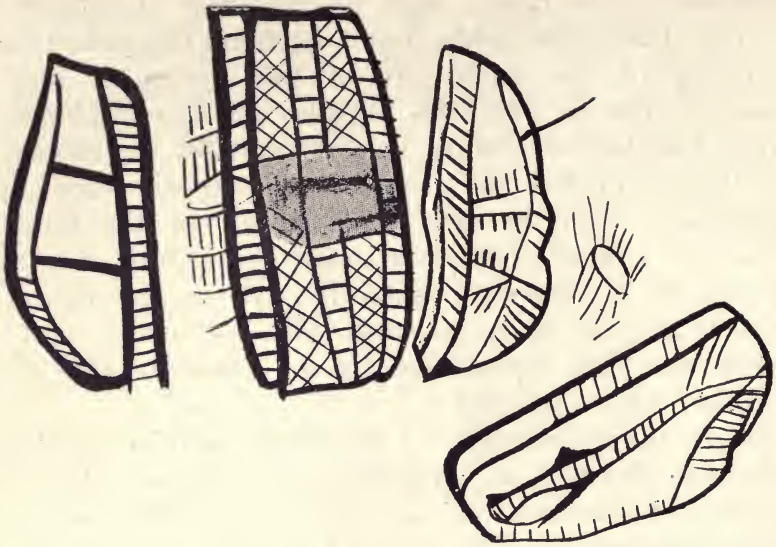


FIG. 79.—Tectiform and Scutiform Figures in black, in the terminal passage of Altamira ; to the scale of $\frac{1}{8}$. (After Cartailhac and Breuil, *L'Anth.*)

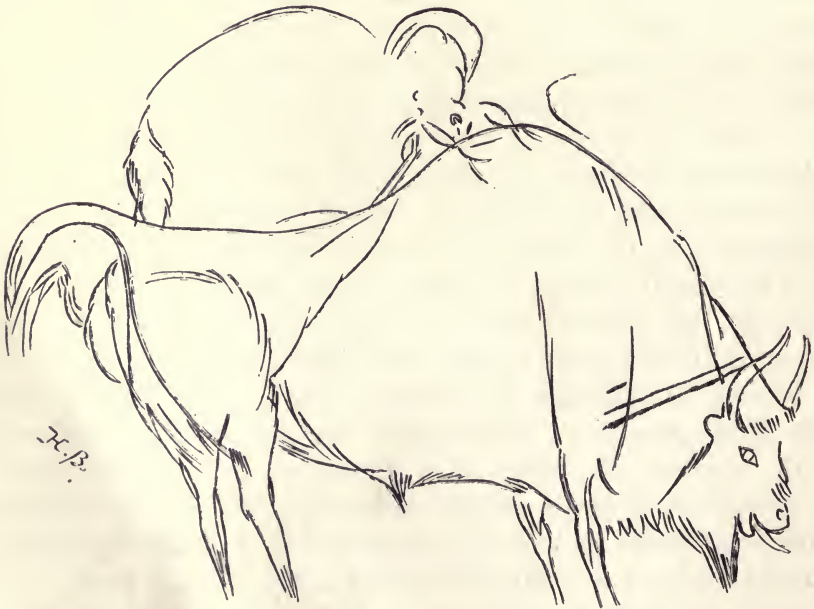
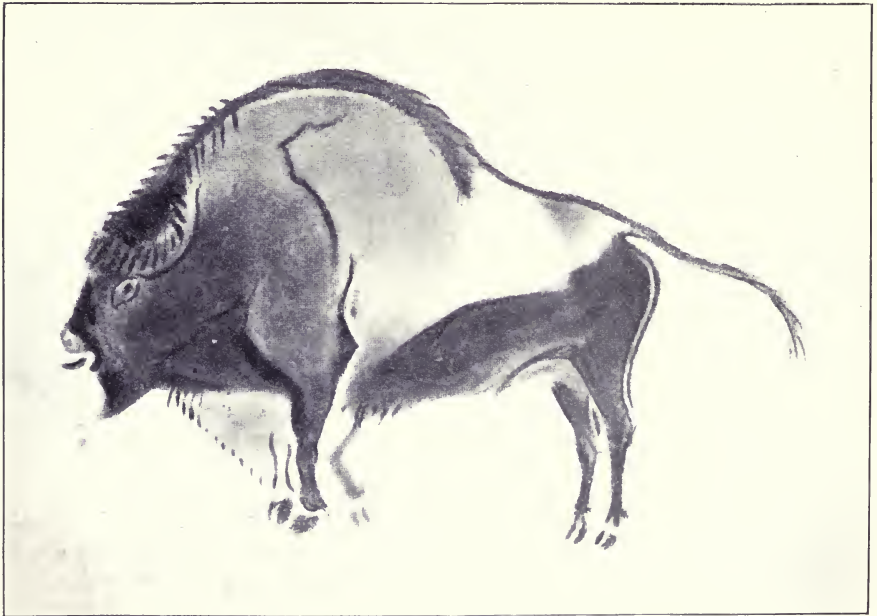


FIG. 80.—Bison and another unknown animal, finely engraved, in the terminal passage of Altamira ; length, 0.57 metre. (After Cartailhac and Breuil, *L'Anth.*)



A.—Polychrome Painting of a Deer (length, 2·20 metres). On the right a small Bison.



B.—Polychrome Painting of a Bison (length, 1·30 metres).

Two of the Animals figured on Plate XXIII. (After Cartailhac and Breuil, *L'Anth.*)

[To face p. 229.

pectiform structures in the caves of Marsoulas, Combarelles, and Font-de-Gaume. Plate XXIV. shows two painted animals, a hind (A) and an auroch (B). The former, a polychrome 2.20 metres long, is painted over a panel with remains of red signs, and a small bison in black belonging to an earlier period. The latter is done in sombre colours of brown and black, and measures 1.30 metres in length. An example of the finely engraved animals is given in Fig. 80, which shows a bison and an unknown animal lightly engraved over deep black lines of an earlier design. This picture is in the terminal gallery and is so faint that it was with difficulty discovered. Among the graffiti are some grotesque figures with long protruding snouts, which are evidently intended to represent human beings (Fig. 86). These will be noticed later on along with analogous figures found elsewhere.

Marsoulas.

This cave is situated near Salies-du-Salat (Haute-Garonne), among the outlying spurs of the Pyrénées. It has been partially explored at various times since 1881, but no importance was attached to the wall-pictures till 1903, when M. F. Regnault published a notice of some of them. More recently they have engaged the attention of MM. Cartailhac and Breuil, the first result of which is the article now before us. The cave extends for about 60 metres, but formerly it was longer. A few metres of its anterior portion had fallen in during, or shortly after, the reindeer period; and so the cave has been sealed up till a recent date. This explains the good state of preservation of the wall-pictures, as well as the absence of Neolithic remains in the débris. The pictures in Marsoulas are on the whole similar to those of Altamira, both in appearance and in execution. The paintings, commencing 15 metres from the entrance, are continued for 40 metres, and their dimensions vary according to the available wall space. The largest bison measures 1.80 metres and the smallest only 0.56 metre. Like those of Altamira and Font-de-Gaume the figures are partly engraved and partly painted. The principal figures of entire animals amount only to 14 (6 horses, 6 bisons, 1 goat, and 1 deer); but the

incompleted figures, consisting mostly of heads, are over 100, among which that of the bison greatly predominates.

Man is also represented by about a dozen incomplete designs, badly drawn, grotesque in character, and altogether inferior in execution to the animal figures (Fig. 86). But this peculiarity need not cause surprise as it is a feature of Palæolithic art in general, for no human representation hitherto known of this kind, whether engraved or painted, goes beyond the artistic efforts of nursery children. It is difficult to believe that it is the same hand which has produced these human and animal figures.

Neither the reindeer nor any of the extinct animals is among the fauna depicted on the walls of either Marsoulas or Altamira. Though distant from the principal centre of the painted caverns of the Perigord, they are considered by MM. Cartailhac and Breuil to have passed through precisely the same phases of evolutionary art.

Niaux.

One more cavern must be briefly noticed in this sketch, because of the curious additions it has made to our knowledge of the art of the period. In the Commune of Niaux there are several caverns, but the one which interests us is known as *La Grotte des Forges*, situated some 4 kilometres from Tarascon (Ariège). The entrance, which is somewhat encumbered by fallen rocks, lies 100 metres above the valley of the Vis-de-Sos, a small affluent of the Ariège. The cavern extends for 1400 metres into the heart of the mountains, in the form of long galleries and spacious chambers adorned with stalactites, and rising sometimes into lofty domes. The floor to a considerable extent is covered with fine sand and rolled gravel, thus proving the action of running water at some former period. MM. Cartailhac and Breuil, to whom we are again indebted for the descriptive details of these mural decorations (*L'Anthrop.*, t. xix., 1908), regard the inner recesses of the cavern as vast solitudes which have undergone no change since the retreat of the glaciers. This, they say, accounts for the fact that the chamber walls, with their figure drawings and enigmatic signs and symbols, are now in precisely the same

condition as they were left by the Magdalénien artists. At the outset we are told that while Altamira carries the palm for polychrome paintings, Niaux is unsurpassed for its freehand drawings. These appear to have been executed with a fine brush, and paint made of charcoal, oxide of manganese, and some oily stuff. Many of the figures display great freedom in linear drawing, unfaltering precision in aim, and astonishing artistic effect. The animals depicted are those usually met with in the painted caverns—bison, horse, goat, and stag, the first named being by far the most numerous. None of them, however, attains life size, the largest, a horse (*un chef d'œuvre*)

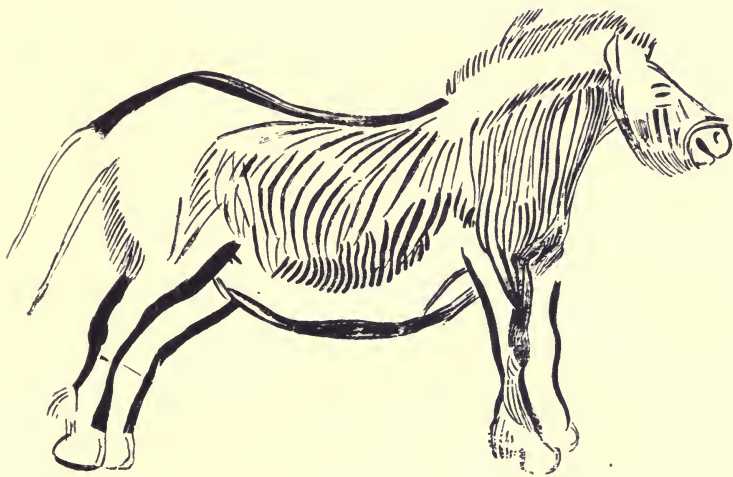


FIG. 81.—Horse, copied from the Salon Noir of the Grotte de Niaux; scale, $\frac{1}{18}$.
(After C. and B., *L'Anth.*)

measures 1.50 metres in length (Fig. 81), while the smallest is only 20 centimetres. Most of the bisons are about 80 centimetres in length. In several instances the investigators observed that some natural projection in the rock, which, to the eye of the artist, simulated some prominent portion of an animal, was utilised as part of the drawing to which the other parts of the animal were made to fit. This adaptation is well shown in Fig. 82, where the dorsal line of a small rampant bison is formed by a natural curved ridge in the rock. One of the new facts, elicited from the Niaux drawings, is that some of the animal figures have one or more arrows painted over their flanks in red or black, as shown by the figure of the largest

bison (Fig. 83), where two arrows with long stems in black have a red arrow-head on each side. The meaning of this and other



FIG. 82.—Pictographic Inscriptions in red: the dotted line forming the back of the bison is a ridge in the natural rock, and the black spot seems to be a wound. The other dots and signs are conjectural. (After C. and B., *L'Anth.*)

points raised is still within the domain of speculation. Among other enigmatic signs are objects like feathered arrows, groups

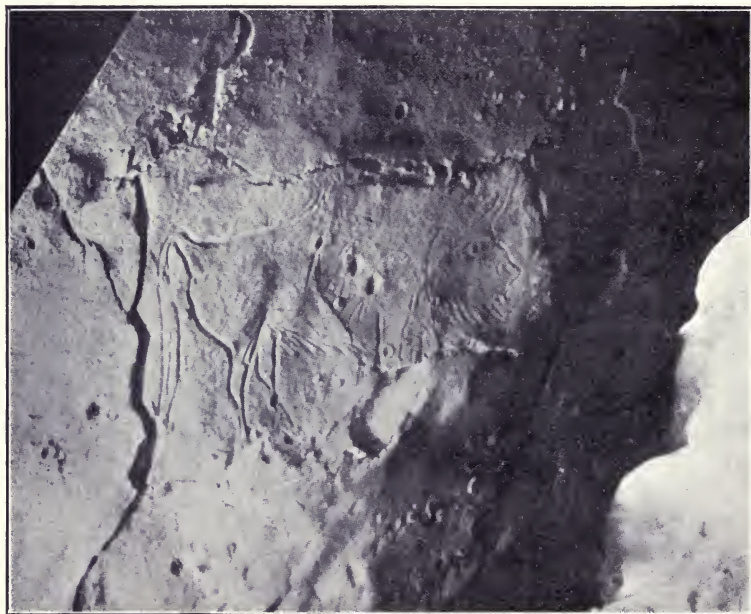


FIG. 83.—Large Bison in Salon Noir de Niaux, with four arrow-marks (the two lateral ones are red); scale, $\frac{1}{10}$. (After C. and B., *L'Anth.*)

of dots in circles, tectiform arrangements, etc. (Figs. 82 and 84). Photographic illustrations are necessarily somewhat obscure, owing to calcareous exudations and natural fading. On Plate



A.—Panel on the Grotte de Niaux, with Stag and Horses. The white band measures 0.40 metre (15 $\frac{3}{4}$ inches—*L'Anth.*).



B.—Design on Hardened Mud, Palæolithic, showing a Bovine Animal.
(After Cartailhac and Breuil, *L'Anth.*)

The Cavern of Niaux, showing Animals drawn on its Wall and Floor.



View of the Rock-shelter of Cap-Blanc, Domaine of Laussel. (After Dr Lalanne and Breuil, *L'Anth.*, 1912.)

XXV. (A) is to be seen a rock-panel with a stag and horses delineated in dark lines, made by a substance composed of charcoal, oxide of manganese, and some greasy stuff. The white band measures 0.40 metre ($15\frac{3}{4}$ inches), and gives some idea of the size of the animal figures.



FIG. 84.—Red Tectiform Signs in the Grotte de Niaux ($\frac{1}{8}$). (After C. and B., *L'Anth.*)

But the most novel discovery of all was that animal figures, similar in design to those on the walls, had been traced on the now hardened mud of the floor. Such figures were observed in several places in the inner recesses of the cave, especially under



FIG. 85.—The Bison in Hardened Mud, as shown on Plate XXV. B; drawn separately ($\frac{1}{8}$).

low overhanging rock where visitors could not walk; and, singular to say, they remained as clear and distinct as if they had been recently executed. Among them the following animals are represented, viz., bison, ox, horse, trout, and man (only a footprint). Plate XXV. (B) shows the figure of a bison in hardened clay close to the rock, and Fig. 85 is a drawing of

the same animal, so as to bring out the details more clearly. Surely these are the most marvellous prints on the "sands of time" ever known.

No archæological débris has been observed in the inner recesses of the cavern. If such deposits do exist they will be found nearer the entrance, like most other inhabited sites; but unfortunately the first hundred metres or so of the old floor are covered with tons of fallen rocks, which make investigation almost impossible. In one spot tentative digging was made, and among the stuff turned up were a few fragments of Bronze Age pottery, showing that the collapse of the roof had not taken place before that date.

Rock shelter of Cap-Blanc (Laussel).

We now return to the classic district of the Dordogne in order to discuss the remarkable rock-sculptures of Cap-Blanc recently brought to light. The white ridge of rock which forms the shelter extends for about 15 metres at a height of 3 to 5 metres above the terrace in front of it, as shown to the right of Pl. XXVI. Since 1894, when M. E. Rivière made some tentative excavations which yielded him a rich assortment of upper Solutréen objects, desultory diggings had now and again been made in this shelter by parties from the village of Les Eyzies, but they sold the objects disinterred to collectors. It was not till 1908, when Dr Lalanne undertook its systematic exploration, that the remarkable rock-sculptures now to be described were discovered. Dr Lalanne commenced operations, with the assistance of M. Raymond Peyrille, by digging a series of deep trenches in front of the rock-shelter—one of which extended for 25 metres down the slope towards the Beune. Seven archæological strata were thus recognised, separated from each other by sterile deposits, as shown by a sketch drawn by the Abbé Breuil on the occasion of a visit to the locality on the 15th April 1908 (*Rev. Préhistorique*, 1909). Dr Lalanne informs us in his article, "Un Atelier de Sculpture de l'Age du Renne" (*ibid.*, 1910), that in cutting the trenches they first passed through soil similar to that on the surrounding plateaux. Then came yellowish clay mixed with decomposed calcareous débris extremely friable, and containing flint imple-

ments and other evidence of human occupancy, and so they called it *foyer supérieur*. Below this there was a layer of clayey sand and blocks of fallen stones which covered another habitable area (*foyer inférieur*), much more extensive and richer in industrial remains than the former. The contents of both these hearths, as regards industrial remains and fauna, were precisely the same. The fauna was characterised by the superabundance of reindeer bones (twenty-three individuals); while the other animals, horse, wolf, fox, lion, a large ox, stag, saiga, etc., were only feebly represented. Among the industrial remains were stone picks, hammers, chisels, scrapers, borers, saws, burins, in great numbers. Also the microlithic flint instruments used for fine work. Objects of bone and horn—needles, polishers, chisels, pointers, and cylindrical rods with chisel endings, and sometimes marked with cross striæ (*marques de chasse*), tubes, whistles—were abundantly turned up, especially about the lower hearth. It is particularly noted that no harpoons were found—a fact which helps to define the chronological horizon of the station as early Magdalénien. Ornaments were represented by perforated teeth and shells, nassa, cyprea, pectunculus, etc.

The works of art, which were few in number, consisted of bones with geometric scratchings. One piece, however, showed the head of a horse, another that of a reindeer. An oval stone, about 3 inches in length, is figured by M. C. Schleicher, which, among other linear designs, has the head of a goat finely incised on it (*L'Homme Préhistorique*, p. 110). An insect form carved in ivory, somewhat like one from the Cave of Trilobite (Yonne), and figured by de Mortillet (*Le Préhistorique*, 3rd ed., p. 426). A *bâton de commandement*, entire and perforated (20 centimetres long). Another *bâton* had the end of a short branch sculptured into the form of a human foot, showing only four toes with nails well defined. A stone palette made of schist, 27 by 15 centimetres, having remains of ochre and manganese still adhering to its surface.

The domicile of these artists consisted of a sheltered terrace, 3 to 4 metres in breadth and 15 metres in length, looking towards a picturesque valley. Here was the hearth around which they manufactured their implements, weapons,

and ornaments. Behind the fireplace there was a raised space 2 metres broad, paved with flags. From this platform access was got to a dry and spacious rock-chamber, also paved with flagstones and measuring 5 by 4 metres.

Among the stones which had fallen from the roof was one which M. Peyrille had occasion to turn over, and in the act of doing so he observed on its under side the form of a bison sculptured in relief and in a good state of preservation. This directed attention to the adjacent rock-surfaces, when they at once detected various deeply cut portions which had been chiselled and polished artificially. The soil, which in the course of ages had accumulated at the base of the rock and was strongly adhering to it in some places, was then carefully removed by wooden palettes. It was then discovered that a large portion of the rock-wall of the shelter was covered with a sculptured frieze of a succession of animals which claims astonishment for its decorative effect even in its present dilapidated condition.

One of the latest accounts of the Cap-Blanc sculptures (*L'Anth.*, 1911, pp. 385-402) is accompanied by a series of photos which give a clear and distinct impression of what still remains of this remarkable specimen of Palæolithic art. As daylight masked the natural shading from the undulating surface of the figures, the photos were taken by night with lights arranged so as to make shadows available in defining the contour of the various animals. Two of these photographs are here reproduced (Pl. XXVII.) which will give a better idea of the character of the work than any lengthened description. The animals appear to have been arranged by the artists in a kind of procession. In scanning them from left to right there is to be seen first a head, but as the rest of the body still remains covered it was impossible to decide whether it was that of an ox or a reindeer. Next to this is a horse, 1.90 metres in length, well seen in Pl. XXVII. (A), and immediately in advance of it a second horse, also seen in the same figure. Then comes a very large horse (B), no less than 2.15 metres (about seven feet) in length, beautifully sculptured, but unfortunately a portion of the body has scaled off; and the head also is broken. Then we come in succession on two un-



A.—Panel showing two Horses, that on left being 1.90 metres long.



B.—A very large Horse, 2.15 metres long.

Two Panels in the Rock-shelter of Cap-Blanc, with Sculptured Horses.
(After Dr Lalanne and l'Abbé Breuil, *L'Anth.*, 1912.)



determined animals, the head and shoulders of a small horse and a group of several large horses, one of which has its head turned in the opposite direction of the supposed procession, and lastly two bisons. Owing to weathering and angularities of the rock surface, it was impossible to bring out in one view all the art characteristics of these animal sculptures. But the two illustrations here reproduced conclusively prove that we have in the Cap-Blanc sculptures works of art of a high order. But when we think that they were executed thousands of years before the dawn of the oldest of the old-world civilisations of Assyria, Egypt, Greece and Rome, curiosity gives place to wonder and boundless admiration.

As these pages are being sent to press I hear from M. Cartailhac that the station of Laussel has yielded still more extraordinary sculptures, viz., human figures executed in relief, with the same realistic style and skill as the animal frescoes just described. According to a communication by Dr Lalanne to the *Académie des Inscriptions et Belles-lettres*, these figures consist of two females and one male. The most important of them is the figure of a woman 0.46 metre in height, sculptured in high relief with traces of red, suggesting that it had been painted. The head has apparently been effaced, but the body is well represented, and shows rounded fleshy prominences on the buttocks, reminding one of the steatopygous condition of certain African races. In the April number of *L'Homme Préhistorique* the writer comments as follows on this important discovery:—"Cette figure est la plus complète, la plus belle et la plus grande de toutes les représentations humaines de la période quaternaire, connues jusqu'à ce jour." The second female is minus the lower limbs, but the hair and breast are well developed. The male figure is in the attitude of a hunter. (See *L'Anth.*, xxiii., p. 130.)

Human representations.

It has been hitherto a matter of astonishment that, notwithstanding the great success of the Palæolithic artists in delineating the lower animals in all their varying moods and attitudes, no delineation of the human form has yet been found which betrays that close attention to details

and artistic merits which characterise many of their animal illustrations, with perhaps the exception of a few small statuettes, mostly made of ivory. The engraved figures on the walls of some caverns, which in some respects depict certain features peculiar to humanity, are either caricatures, or intended, as some suppose, to represent intermediate links between man and the anthropoid apes. A few of these designs are given in Fig. 86, but nothing more can be said of them. Several pieces of bone and reindeer-horn, engraved with figures which

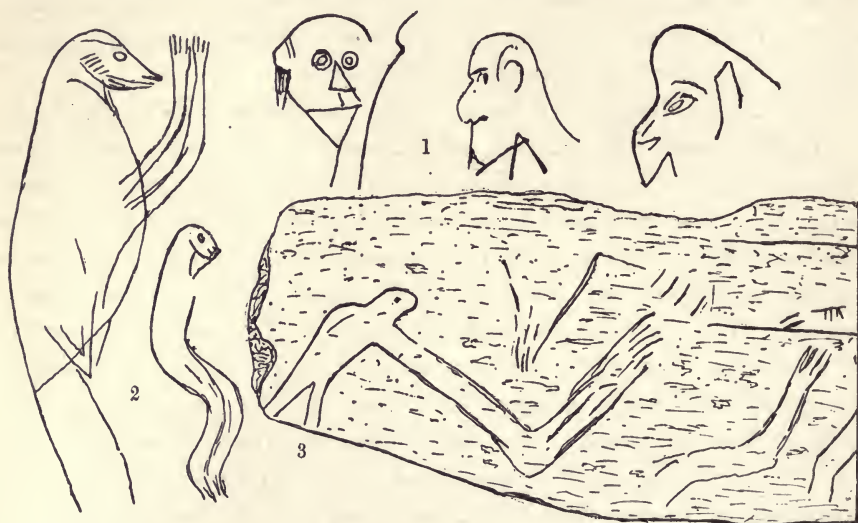
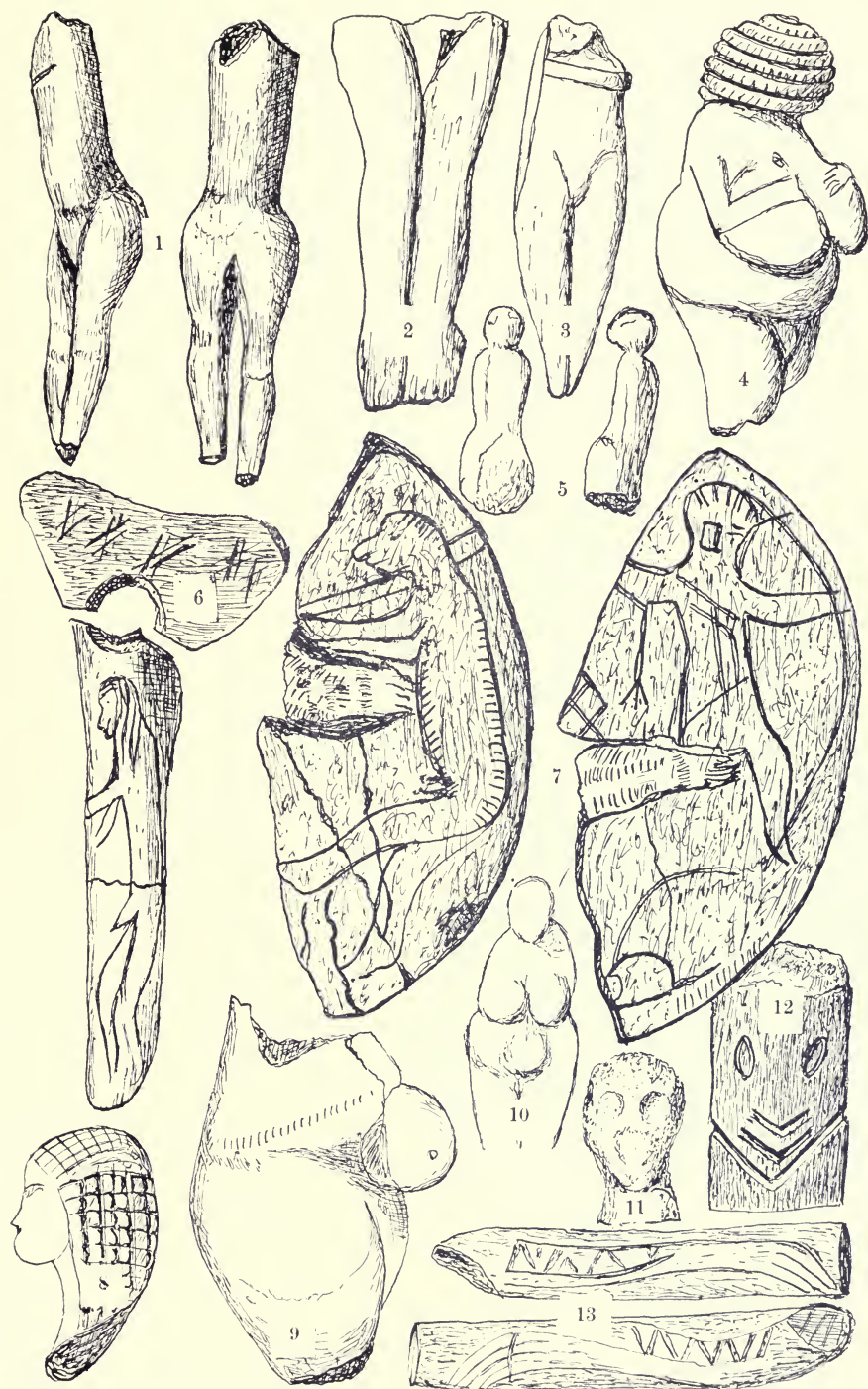


FIG. 86.—Sketches of the Human Form. (1) Three faces from the Cave of Marsoulas; (2) ape-like forms from Altamira; (3) figure of man, with disproportionate outstretched arm, from Laugerie Basse (after Girod et Massénat).

there can be no doubt were intended to represent human beings, male and female, have been found, and, although they cannot be reckoned as works of art, are of some scientific value for the inferences they suggest. All these figures, both male and female, are depicted as naked and having their bodies covered with hair. From the station of La Madeleine we have the figure of a quiet-looking man carrying a club on his shoulder, engraved on a *bâton de commandement* (Pl. XIX. (A)); also some fragments of lance-heads of reindeer-horn each having a human hand showing only four fingers engraved on it (Pl. XXVIII., No. 13). Laugerie Basse has supplied a fragment of bone with a pregnant woman and reindeer



Various Figures engraved and sculptured, representing the Human Form (all $\frac{3}{4}$ except No. 7 = $\frac{1}{2}$.)
(For details, see List of Illustrations.)

[To face p. 238.]

engraved on it (Fig. 87); the Venus impudique, a headless statuette carved in ivory (Pl. XXVIII., No. 1); a piece of reindeer-horn coarsely sculptured into the shape of a human head (No. 11); the incised figure of a man with a disproportionately long arm (Fig. 86, No. 3); and the famous picture of a man hunting an auroch (Pl. IX., No. 1). From the Cave of Rochebertier (Charente) there is a human head (Pl. XXVIII., No. 12), and from that of Pont-à-Lesse (Belgium) a small body figure (No. 5), both made of reindeer-horn. From the caves of Brassempouy (Landes) and Grimaldi (Italy) and others we have a number of statuettes in ivory and steatite (Nos. 2, 3, 4, 8, 9, 10). Finally, the anthropoid figures (Nos. 7 and 6) are from the stations of Mas-d'Azil (Ariège) and Gourdon (Haute-Garonne). It will be observed that the Chasseur d'Aurochs and Piette's anthropomorphous ape have long hair over the body. The female figure from Laugerie Basse also has hair on the body, but it is represented as of a finer quality.



FIG. 87.—Fragment of Bone, showing a Woman and Reindeer—Laugerie Basse (§). (Col. Piette.)

There are many other problems bearing on the culture and civilisation of the Palæolithic people of Europe which naturally come within the scope of these lectures, but which have scarcely been touched upon, such as the domestication of some animals, as advocated by the late M. Piette with regard to the horse; the value of the recently discovered ceremonial interments as evidence of religiosity; the relation of Palæolithic civilisation to that of present-day savages, etc. But these problems can lie over to be discussed by my successors in this lectureship.

Concluding remarks.

When you carefully consider the facts and inferences now laid before you, the first and paramount idea in your minds

will doubtless be admiration of the skill and assiduity with which anthropologists have resurrected, from the merest waifs and strays, an old-world phase of humanity of which, half a century ago, the civilised world was as ignorant as they are now of the inhabitants of the planet Mars. The intense desire of knowing something of the past history of mankind—a desire which is growing and unquenchable in the breasts of a large section of the more thoughtful races in the world of to-day—has led to the exploration, in comparatively recent times, of the bygone civilisations of the old-world empires of the Assyrians, Hittites, Egyptians, Greeks, and Romans. Among the remains thus brought to light you will find much to illustrate the progressive march of mankind to higher ideals. But the lines of advance are very similar to those on which the world is still governed—so much so that after perusal of the results one is apt to exclaim, “There is nothing new under the sun.” If you want to go to the root of human civilisation you must go back to Palæolithic times, where its earliest germs and rootlets are to be found. The system of human economy founded in these early days was the outcome of the free play of natural laws little affected by the principles of religion or ethics—for the mysteries of the supernatural had not yet developed into the concrete ideas of gods or demons. Neither gloomy foreboding nor qualms of conscience had much influence on the actions of these people. Their philosophical and sentimental reflections centred on the habits of the animals they hunted, and the strategic means by which they could be waylaid and captured. Of agriculture, the rearing of domestic animals, the arts of spinning and weaving, and the manufacture of pottery they appear to have been absolutely ignorant. But, yet, in an environment of such primitive resources and limited culture associations, these wild hunters developed a genuine taste for art, and cultivated its principles so effectually that they have bequeathed to us an art gallery of some four or five hundred specimens of engravings, sculptures, and even paintings in colour, many of them being so true to their models that they bear a favourable comparison with analogous works of the present day.

CHAPTER XI

ON THE TRANSITION BETWEEN THE PALÆOLITHIC AND NEOLITHIC CIVILISATIONS IN EUROPE

The *Hiatus* Problem. The Evidence. (1) The Cavern of Mas-d'Azil. (2) La Grotte de Reilhac. (3) The Bone Caves of Ojcow. (4) Cave of Ofnet. (5) The MacArthur Cave. (6) Early Man in the Forth Valley. (7) The Rock-shelter of Drummargie. (8) Shell-heaps in Oronsay. (9) Shell-heap on Inchkeith. (10) Sporadic Finds of Harpoons in Britain. (11) Distribution of Neolithic Harpoons. (12) Rock-shelter of Schweizersbild. (13) Moulin des Liesberg and Bellerive. (14) Hut-dwellings at Campigny. (15) Tardenoisien Flint Industry. (16) A Floating Lacustrine Station. (17) Danish Kjökkenmöddings. (18) Shell-heaps in Portugal. (19) General conclusion.

THE story of mankind, as disclosed by their teleological inventions and the ingenuity displayed in adapting themselves to the vicissitudes of the changeable environment which obtained in Europe during the Quaternary period, forms a unique chapter in the history of the organic world. In exploiting the trail of their existence throughout the dim vista of bygone ages, as revealed by the waifs and strays which they have dropped by the way, there is one special characteristic applicable to all their productions which must be steadily kept in mind in dealing with such an inquiry, and that is, that every object bears the impress of the skill and intelligence of its manufacturer. On this assumption it follows that the tools, weapons, ornaments, and other relics of the prehistoric inhabitants of the world form a graduated scale of the progressive culture and civilisation of their owners. This is the magic key by which the long-hidden secrets of past humanity are now being unlocked. Owing, however, to the inevitable disintegration, which sooner or later overtakes all organic compounds, only a few of their handicraft products have

resisted the gnawing tooth of time to the present day. For this reason the most ancient human relics now extant consist of objects made of such durable material as flint and other hard stones, which are incidentally met with on the highways and in the haunts of their primeval owners, or intentionally disinterred from the dustbins of ages.

The evidential materials, available in the discussion of the special problem which forms the heading of this chapter, are based on a combination of facts derived from stratigraphy, archæology, and palæontology, which, being supplementary to each other, strengthen the final deduction in proportion to the amount of agreement between the respective results elicited from these different lines of research. But, unfortunately, the data which might have been forthcoming through one or other of these departments are often wanting, or too fragmentary to be of ethnical value—a condition of things which has sometimes led the most competent explorers to formulate conclusions on insufficient grounds. Apparently this accounts for the diversity of opinion which has long permeated archæological circles with regard to the relation between the Palæolithic and Neolithic civilisations of Europe. Before proceeding to the discussion of the main question a few preliminary remarks are necessary, by way of defining the special characteristics of the two civilisations, so as to bring into relief the nature of the so-called *hiatus* which, according to some authorities, separates them.

As described in the preceding chapters, the two chief sources of our knowledge of the earliest inhabitants of Europe are (1) some ancient river-gravels containing stone implements and bones of extinct animals reposing at various heights on the slopes of present, or former, river valleys, the waters of which now flow at considerably lower levels; (2) a number of caves, rock-shelters, and other inhabited sites, which have yielded to the explorer not only stone implements but other objects made of various materials, as well as a heterogeneous mass of food-refuse, chiefly the broken bones of the animals on which their occupants feasted; and (3) the fossil remains of man. Little is known ethnologically of the Drift-men, beyond the fact that they manufactured rude stone implements generally

made of flint, and mostly of the type known in France as the *coup-de-poing*. On the other hand, the relics of the Cave-men are so numerous, varied, and suggestive, that the progressive march of their owners to a higher state of culture can be pictorially portrayed by the slow accretions which time and experience have made to the development of their mechanical tools.

Concurrent with these evolutionary improvements in the social conditions and resources of the Palæolithic people there were marked changes in the environment—physical, geological, and climatal—which prove that there was a vast interval of time between the River-drift men and the later Cave-men of France. When Neolithic tribes first appeared in Europe, the physical causes which were slowly affecting the distribution of land and water had already moulded the European continent to about the same limits as it now possesses, one marked change being that the British Isles were no longer part of it. This indicates a short chronological range for Neolithic civilisation in comparison with that for the Palæolithic, as suggested by the time that has rolled past since the high river-gravels were deposited and the valleys excavated to their present levels. It is, however, the striking contrast between the ways, works, and methods of living of the two peoples which has been chiefly adduced as the principal argument in support of the theory that their respective civilisations had no evolutionary connection. But it does not follow from the disparity of the relics, however great, that the two races had not set eyes on each other. What better example could be instanced than the Red Indians and modern Americans, whose civilisations are so different that, if estimated by their respective implements, weapons, tools, and ornaments, they might be said to be separated by a long interval of time; and yet they have lived together for centuries. M. Gabriel de Mortillet, in bringing his system of classification before the members of the International Congress of Anthropology and Prehistoric Archæology held at Brussels in 1872, thus expresses his views:—

“Entre les diverses époques paléolithiques, on suit le développement régulier et logique de l’industrie; on en trouve des transitions et des passages.

Des degrés, des points intermédiaires, peuvent encore faire défaut, mais on sent, on reconnaît, qu'il y a suite continue. Il n'en est plus de même entre le paléolithique et le néolithique, entre le Magdalénien et le Robenhausien. Il y a là une large et profonde lacune, un grand *hiatus*; il y a une transformation complète.

"Avec le Magdalénien disparaissent les animaux quaternaires, le Grand Ours, le Mammoth, le Mégacère; avec le Magdalénien émigrent les espèces des régions froides qui peuplaient nos plaines; le Renne, le Gluton, le Bœuf musqué, remontent vers le pôle; le Chamois, le Bouquetin, la Marmotte, gagnent le sommet neigeux de nos montagnes.

"Avec le Robenhausien (néolithique) ont apparu non seulement les instruments en pierre polie, mais encore la poterie, les monuments, dolmens et menhirs, les animaux domestiques et l'agriculture. C'est donc un changement complet." (*Comptes rendus* (1872), p. 440.)

The doctrine here advocated by De Mortillet was then held by a majority of the ablest palæontologists of the day, at the head of whom stood Edward Lartet. Dr Broca, however, and a few others, maintained that the flint tools of the later Palæolithic stations and those of Neolithic times were not so dissimilar as to justify the idea that there was any break in the continuity of this industry in Europe; and further, that there was valid evidence to show that the extremely dolichocephalic race of the sepulchral caverns of the Lozère (Baumes Chaudes, l'Homme Mort, etc.), so well explored by Dr Prunières, were the descendants of the Cave-men.

At the meeting of the same Congress held at Stockholm (1874), M. Cazalis de Foudouce reviewed the *hiatus* problem, in all its aspects, in a masterly paper entitled "Sur la Lacune qui aurait existé entre L'âge de la pierre taillée et celui de la pierre polie," in which he combated De Mortillet's theory on every point. His general conclusions were that the transition from the one civilisation to the other was slow, but without interruption since the commencement of the Palæolithic period down to the present day; that towards the close of that long period two or more different races had combined and ultimately developed the primary elements of Neolithic civilisation; that the ameliorated climate attracted from time to time new immigrants who imported improved elements into the arts and industries; and finally, that the incoming tribes gradually absorbed the indigenous people of the old Stone Age, thus accounting for the persistence of the marked ethnic peculiarities

of the Palæolithic races in the populations of Europe of the present day.

Before considering subsequent and more recent investigations, bearing on the solution of this problem, it may be interesting to note the opinions held on the subject by one or two British archæologists.

Writing in 1872, Sir John Evans thus expresses himself:—

“There appears, in this country at all events, to be a complete gap between the River-drift and Surface Stone periods, so far as any intermediate forms of implements are concerned ; and here at least the race of men who fabricated the latest of the Palæolithic implements may have, and in all probability had, disappeared at an epoch remote from that when the country was again occupied by those who not only chipped out, but polished their flint tools, and who were, moreover, associated with a mammalian fauna far nearer resembling that of the present day than that of Quaternary times.” (*Ancient Stone Implements*, etc., p. 618.)

Professor Huxley, in discussing the problem in his essay on the Aryan question (1890), was unable to take a side in the controversy, though the continuity of the races seemed to him the more likely to be right.

“As I have already mentioned,” he writes, “there is not the least doubt that man existed in North-Western Europe during the Pleistocene or Quaternary epoch. It is not only certain that men were contemporaries of the mammoth, the hairy rhinoceros, the reindeer, the cave bear, and other great carnivora, in England and in France, but a great deal has been ascertained about the modes of life of our predecessors. They were savage hunters, who took advantage of such natural shelters as overhanging rocks and caves, and perhaps built themselves rough wigwams ; but who had no domestic animals, and have left no sign that they cultivated plants. In many localities there is evidence that a very considerable interval—the so-called *hiatus*—intervened between the time when the Quaternary or Palæolithic men occupied particular caves and river basins, and the accumulation of the *débris* left by their Neolithic successors. And, in spite of all the warnings against negative evidence afforded by the history of geology, some have very positively asserted that this means a complete break between the Quaternary and the recent populations—that the Quaternary population followed the retreating ice northwards and left behind them a desert which remained unpeopled for ages. Other high authorities, on the contrary, have maintained that the races of men who now inhabit Europe may all be traced back to the Great Ice Age. When a conflict of opinion of this kind obtains among reasonable and instructed men, it is generally a safe conclusion that the evidence for neither view is worth much. Certainly that is the result of my own cogitations with regard to both the *hiatus* doctrine (in its extreme form), and its opposite—though I think the latter by much the more likely to

turn out right. But I hesitate to adopt it on the evidence which has been obtained up to this time." (*Collected Essays*, vol. vii., p. 318.)

Mr. J. Allen Brown contributed to the Anthropological Institute (1892) an elaborate paper "On the continuity of the Palæolithic and Neolithic periods," in which his line of argument is thus stated :

"The supposed break in the continuity of the Stone Age in this country is bridged over by the discovery of implements of later Palæolithic type and of others which from their form may be regarded as of transition or intermediate age, in some combs and dry valleys associated with deposits of chalk and flint rubble in parts of Sussex, as well as with other accumulations and formations to which I shall refer as being of more recent date than the high level river drifts. The gradual change in mammalian life which appears to have accompanied these higher stages of the Stone Age will also be considered." (*Journal*, vol. xxii., p. 67.)

A *prima facie* objection to Mr Brown's method is that no legitimate inference can be drawn from a graduated series of stone implements picked up on the surface, as in all large finds and workshops of Neolithic implements a sufficient number of unfinished, or roughly made, specimens may be readily found which, in appearance, can be paralleled with the later Palæolithic types.

In the following year (1893), and at the same Society, Professor Boyd Dawkins read a paper "On the relation of the Palæolithic to the Neolithic period," in which his opinion is thus stated :—

"If, however, the results as I read them, over the whole of Europe, point to the great interval dividing the Palæolithic from the Neolithic Age, and to the great geographical break between them, still more shall we find these conclusions confirmed by the contrast between the Palæolithic and Neolithic civilisations. On the one hand—it is unnecessary to labour the minute details—the Palæolithic man lived by hunting the wild animals on the Pleistocene continent, armed with rude implements of stone and bone, and ignorant of all the domestic animals, including the hunting dog. He was a fire-using nomad, without fixed habitation. On the other hand, the Neolithic man appears before us a herdsman and tiller of the ground, depending on his domestic animals, and the cultivated fruits and seeds rather than on hunting ; master of the potter's art, and of the mysteries of spinning, and weaving, and seeking the materials for his tools by mining. He lived in fixed habitations, and buried his dead in tombs. There is obviously a great gulf fixed between the rude hunter civilisation of the one, and the agricultural and pastoral civilisation of the other, a gulf which has not yet been bridged over by discoveries in any part of the world." (*Journal*, vol. xxiii., p. 248.)

In the evening address, "On man as artist and sportsman in the Palæolithic period," which I had the honour of delivering at the Southport Meeting of the British Association (1903), I thus alluded to the *hiatus* theory:—

"When the physical conditions which called into being the accomplishments and special attainments of Palæolithic man had passed away, and the peculiar fauna of the glacial period disappeared from the lowlands of Central Europe—some by extinction, and others by emigration to more northern regions or to the elevated mountains in the neighbourhood—we find the inhabitants of these old hunting grounds in possession of new and altogether different sources of food. Finding the former supplies becoming so limited and precarious that it was no longer possible to live a roaming life, now gathering fruits and seeds, and now hunting wild animals, they fell somehow into the way of cultivating special plants and cereals, and rearing certain animals in a state of domestication. Whether this new departure was a product of the intelligence of the descendants of the Palæolithic people of Europe, or derived from new immigrants into the country, is a debatable question. At any rate the expedient was eminently successful. It was in reality the starting point of Neolithic civilisation, and henceforth there was a rapid increase in the population. They cultivated a variety of fruits, wheat, barley and other cereals; they reared oxen, sheep, goats, pigs, horses and dogs; they became skilled in the ceramic art, and in the manufacture of cloth by spinning and weaving wool and fibrous textures; they ground stone implements so as to give them a sharp cutting edge; in hunting the forest fauna of the period they used, in addition to spears, lances and daggers, the bow and arrow; they built houses, both for the living and the dead—thus showing that religiosity had become an active and governing principle among them. But of the artistic taste and skill of their predecessors they had scarcely a vestige, and whatever they did by the way of ornament consisted mainly of a few scratches, arranged in some simple geometrical pattern. The fundamental principles of the two civilisations are really so divergent that the Neolithic can hardly be regarded as a local development of the latest phase of that of the Palæolithic period in Europe. The probability is that, while the isolated colonies of reindeer hunters were still in existence, people, possibly of the same stock, were elsewhere passing through the evolutionary stages which connected the two civilisations together." (*Proc. R. S. Edinburgh*, vol. xxv., p. 123.)

It appears to me that the difficulty about this so-called *hiatus* arises partly from a misconception of the facts, and partly from a deficiency of our knowledge of existing archæological materials. If it be the case that it is a theoretical figment, time with some spade work will soon remedy the mistake. Although the progress of the Palæolithic people to a higher civilisation had been extremely slow, still their handicraft products, at successive stages, indicate not only an

advance in mechanical skill and execution of design, but a deeper insight into the phenomena of nature. Hence the magnitude of the differences observed between different groups of Palæolithic remains, when contrasted with the products of Neolithic culture, must largely depend on the degree of civilisation to which the owners of the former had attained. It is not an uncommon occurrence to come upon a cave containing Neolithic and Palæolithic remains separated from each other only by a thick stratum of stalagmite, as for example in Kent's Cavern, in which case there can be no doubt that the facts prove a *hiatus*, representing a period of time which can only be estimated by great physical changes in the environment and the extinction of some of the local fauna. But, let us suppose a case where the two culture beds are not separated by stalagmite, and that we have satisfactory evidence that the owners were contemporary with each other, how would this condition of things affect the *hiatus* theory? In this case the *hiatus*, so far as the relics are concerned, would remain precisely as before, only the element of time would be reduced to the vanishing point. The difference of technical skill disclosed by these respective remains constitutes in many instances the only barrier which has not been bridged over. Indeed, it is the occasional absence of a transition stage between the two civilisations which forms the strongest argument in support of the current opinion that the Neolithic races were immigrants into Western Europe. I am not, however, aware of any evidence which actually negatives the idea that the Quaternary men of Europe survived till the arrival of the Neolithic tribes, and that both races continued to live amicably in the same neighbourhood and ultimately amalgamated with each other. If the former were absorbed peacefully by the latter the amalgamated population would necessarily adopt the mode of living best adapted to the altered conditions of the environment, *i.e.*, Neolithic methods. The gradual disappearance of the reindeer and other mammalia would henceforth necessitate a complete change in their manner of living. The nomadic hunter would soon sink into the herdsman, and the mechanic would readily lay aside his roughly chipped tools for those with finely ground and polished

edges. On the other hand, should a few caves and rock-shelters in one or two favourite localities continue to be inhabited after the arrival of the Neolithic tribes on the scene there might be few traces of amalgamation to be found. Such points of contact have, however, been discovered in more recent times in various parts of the European Continent. It is on the validity of the evidence furnished by these transition stations that the *hiatus* problem must be finally solved. Stations with undisturbed and successive strata containing remains of the two civilisations are now so numerous that only a few of the more important can be here considered.

(1) *The Cavern of Mas-d'Azil.*

The late M. Ed. Piette was one of the most strenuous advocates of the existence of a transition period, evidence of which he had obtained in several caves and rock-shelters situated in the south-west of France among the rocky regions to the north of the Pyrenees, the most important of which is the Cavern of Mas-d'Azil (Ariège). This is a vast subterranean gallery about 400 metres in length, at the bottom of which foams the turbulent waters of the Arise. During the construction of a road along the stream the relic-bearing deposits were discovered. M. Piette, who commenced the systematic excavation of the cave in 1887, recognised two sites of habitation by man, one about the middle of the cave on the right of the Arise, and the other near the entrance on its left. A *résumé* of his researches on this site was brought before the 10th Congress of Anthropology and Prehistoric Archæology held in Paris (1889), with the result that there was a consensus of opinion among the members that his discoveries proved that the interval between the two civilisations in that locality had been of short duration. Some of the more remarkable relics were exhibited at the meeting, where I had an opportunity of inspecting them. Subsequently (1895) M. Piette published a more detailed account of the structure and contents of the stratigraphical deposits at the entrance to the cave and on the left bank of the Arise (*L'Anth.*, vols. vi. and vii.), of which I subjoin a brief outline.

Above a stratum containing relics characteristic of the

Reindeer age, but beneath deposits with relics equally characteristic of the Neolithic period, he describes two beds, the combined depth of which amounted to about 4 feet, which yielded the relics supposed to indicate a transition period.

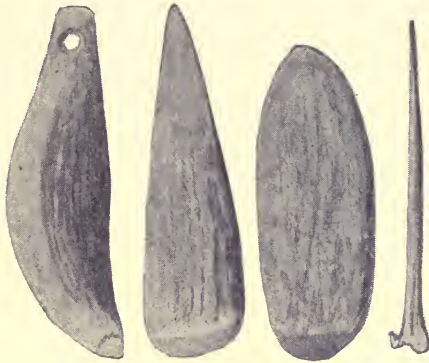
The lower of these two beds was composed chiefly of ashes and wood-charcoal, intermingled with some fallen rocks. The thickness of this bed was $25\frac{1}{2}$ inches, and among its contents the following worked objects were found: flint knives and scrapers, a number of perforated deer-teeth arranged as if they



FIGS. 88-93.—Bone Implements from the Cave of Mas-d'Azil, France ($\frac{3}{8}$). (Col. Piette.)

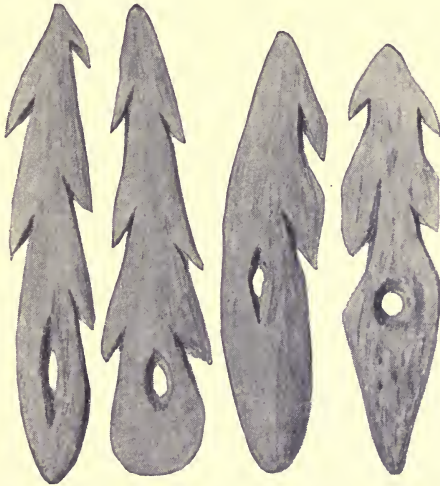
had formed a necklet, also perforated teeth of various other animals (Fig. 94); pins, polished pointers, and spatulæ of bone (Figs. 88-93); barbed harpoons made of stag-horn, some being perforated at the butt-end with an oval or round hole, and others having the barbs on one side only (Figs. 98-101); also a large number of pebbles of quartz or schist—such as could be picked from the bed of the river—some round-nosed and pestle-shaped, showing usage markings at one end (Fig. 96), and others flat and oblong having various devices painted on them with peroxide of iron (Fig. 102). The fauna was represented

by bones of the stag, *Cervus canadensis*, roebuck, chamois, ox, horse, common bear, wild-boar, badger, wolf, beaver, rat, and some birds and fishes. Grains of wheat and a variety of fruit-stones and seeds were also identified. The larger bones of two



FIGS. 94-97.—A Bear's Tooth, a Horn Chisel, a Stone Implement, and a Bone Pin from the Cave of Mas-d'Azil ($\frac{3}{4}$). (Col. Piette.)

human skeletons, which appeared to have been buried after the flesh had been removed, had also been marked with red patches of the peroxide of iron.



FIGS. 98-101.—Harpoons made of Stag-horn, from the Cave of Mas-d'Azil ($\frac{3}{4}$). (Col. Piette.)

Superimposed on this bed, but passing from it almost insensibly, were deposits of wood ashes ($23\frac{1}{2}$ inches thick) streaked with bands of grey, white, and red, in which were embedded quantities of land shells (*Helix nemoralis*), evidently

the remains of repasts. These shell-heaps were intercalated between the layers of ashes, and extended over several yards with a maximum depth of about 1 foot. In this bed (*Assise à escargots*) were also found harpoons and other relics similar to those in the bed of coloured pebbles; and in addition to these there were portions of small chisel-like implements of stone with sloping and abraded ends (Fig. 103), but no regular stone axes—only in the superincumbent layers were the latter found; and above all were deposits containing objects of bronze and iron. It was also observed that the snail-shells had become altered to the variety known as *Helix hortensis*, which, it is said, indicated a drier climate.

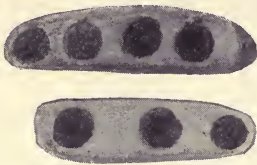


FIG. 102.—Pebbles painted with red spots, from the Cave of Mas-d'Azil ($\frac{3}{4}$). (Col. Piette.)

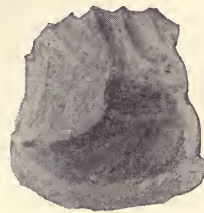


FIG. 103.—Flint Implement, with a polished cutting edge, from the Cave of Mas-d'Azil ($\frac{3}{4}$). (Col. Piette.)

According to M. Piette there were changes in the external environments which could be correlated with these successive deposits. As the Reindeer period passed away the climate became ameliorated but humid, as inferred from the presence of fruit-trees and the cultivation of grain. The people appear to have lost their artistic taste for carving on bones, and instead of it they manufactured harpoons of red-deer horn without a trace of ornament, painted selected pebbles with quaint devices or mere lines and round spots (Fig. 102), and practised some obscure sepulchral rites, in which the red paint on the desiccated bones seemed to play a part. M. Piette classified these painted stones into numerals, symbols, pictographs, and alphabetical characters, and to illustrate his views he issued a series of coloured plates showing the designs on some hundreds of these pebbles. Can there be any doubt about the genuineness of these pebbles?

The chief interest in the discoveries at Mas-d'Azil lies

in the harpoons of red-deer horn, the real significance of which had then, for the first time, been recognised, although a few specimens had already been found in one or two other caves and rock-shelters of the district. Since then, however, they have been discovered in considerable numbers, and are regarded as typical relics of the transition period. In face of these, and other rapidly accumulating facts, proving the existence of deposits of human débris containing relics stratigraphically proved to be later than those of the Reindeer period, but older than those of the polished Stone Age, de Mortillet abandoned the *hiatus* theory and filled up the gap by adding a new epoch to his previous classification of the Palæolithic Age, which he called *Tourassien*, after the Grotte de la Tourasse (Haute-Garonne). This station was explored in 1891 by MM. Chamaison and Darbas, and yielded, along with a few other bone relics of intermediary forms, no less than a dozen harpoons of the kind now under review. The deposits in which they were found lay beneath a series of Neolithic burials. The flatness which is characteristic of these harpoons is due to the fact that the texture of red-deer horn is spongy in the interior, and consequently it is only the outside of the horn that is used in their manufacture. On the other hand, the harpoons of the Palæolithic period have round stems and conical butts, with two projecting knobs close to the butt-end, instead of a hole, for keeping the string from falling away when the harpoon becomes eliminated from the handle. Altogether, they have a finer finish than the former, and show, either two rows of barbs, one on each side, or one row, having the barbs more closely set. The larger specimens are invariably made of reindeer-horn, but the smaller ones are sometimes made of bone.

(2) *La Grotte de Reilhac.*

Another station which has yielded flat harpoons is the Grotte de Reilhac (Lot), described by MM. Cartailhac and Boule (1889). Although the circumstances in which the Reilhac specimens have been found are not so definite as to give them a precise chronological value, the facts are by no

means inconsistent with the opinion that they belonged to the same age as those from Mas-d'Azil. The contents of the cave having been largely removed by the proprietor before the matter came under the notice of the explorers, there remained only a small portion of undisturbed material from which the relative sequence of the deposits could be ascertained. So far as the contents of the deposits were determined, they were as follows, from above downwards :—

- (a) A bed of blackish earth containing clay, charcoal, angular pieces of the limestone rock, and shells (*Helix nemoralis*), mostly very much broken. The soil, generally loose, was here and there cemented by stalagmitic deposits. Bones of the red-deer, ox, and horse, together with small worked flints and minute fragments of pottery, were also collected in it.
- (b) Then came a veritable *breccia* of rabbit-bones, mixed with charcoal, ashes, and angular pieces of rock, the whole cemented by a stalagmitic matrix. It also contained, especially in its lower portion, the bones of larger animals, and one of the explorers found in it a portion of a slender bone ornamented by cut notches like a tally stick.
- (c) The next stratum was of great thickness (over 6 feet), and presented a reddish colour which it had gradually assumed. Its substance was a homogeneous clayey earth mixed with the usual angular fragments from the walls of the cave, in which were found many flint implements and worked bones, some of the latter being characteristic of the Reindeer period.

In classifying these three deposits according to the remains of the fauna collected in them, the authors state that the superficial layer (a) represented the Neolithic period, and that both (b) and (c) corresponded with the Reindeer Age. After contrasting the scarcity of the remains of the reindeer with the abundance of those of the red-deer, and commenting on the almost entire absence of the extinct and emigrated

animals, they make the following remarks pertinent to the problem at issue:—

“Cette absence totale d’animaux éteints et d’animaux localisés aujourd’hui dans les régions septentrionales, jointe à la rareté relative des ossements de Rennes, nous porte à penser que les dépôts à ossements de la grotte de Reilhac correspondent à la fin du Quaternaire supérieur, et peuvent être regardés comme se rattachant de très près à l’époque actuelle.” (*La Grotte de Reilhac*, 1889, p. 27.)

Considering the comparative lateness of the archæological horizon here indicated, and the impossibility of assigning



FIGS. 104-109.—Four Harpoons and two small Implements made of the horns of Cervidæ, from the Grotte de Reilhac (§).

the worked bone and horn objects to their precise position in the deposits—most of them having been discovered and dispersed among collectors before the authors came on the scene—it is peculiarly significant to find among them harpoons (Figs. 104-107) so precisely similar to those from Mas-d’Azil. Their association with other harpoons characteristic of the Reindeer period is not, therefore, fatal to the theory that the former were products of the Neolithic period. Indeed the same uncertainty hangs over most of the specimens of this type of harpoon found on Reindeer stations, partly

due to the fact that their characteristic differences had not then attracted attention, and consequently they had not been recognised as belonging to a different civilisation.

Another point of uncertainty about these harpoons is whether or not the flat specimens were exclusively made of red-deer horn. The butt-end of one, with an oval perforation, and described as made of reindeer-horn, was found in La Madeleine (*Reliq. Aquitanicæ*, p. 160, fig. 57); another, described as flat, with a round hole at the butt, and made of reindeer-horn, is recorded from the Grotte de Vache and figured in *Musée Préhistorique* (fig. 187). If, therefore, it be true that some of these flat harpoons were made of reindeer-horn it only adds to the importance of this link between the two civilisations, as it proves that when the scarcity of the reindeer material was increasing the old Palæolithic people gradually resorted to the horn of the red-deer as a substitute for making their harpoons, though inferior in quality to the former, and that they had already altered the form to suit the nature of the new material.

The flint implements found in the Reilhac settlement include types common to all the Palæolithic epochs, as well as others which are considered to belong to the Neolithic Age. Among the relics characteristic of the latter are polished stone axes, and the deer-horn sockets with which they were fastened into the wooden handle, grain-bruisers, and fragments of pottery. Curiously enough a number of perforated phalangeal bones of the horse and ox, formerly supposed by Lartet and others to be whistles, are also noted. The station would thus appear to have been occupied with little interruption from Palæolithic to Neolithic times.

(3) *The Bone Caves of Ojcow.*

The caves described by Professor Römer of Breslau in the vicinity of Ojcow (Poland) occur in a range of oolitic hills extending some 15 miles to the north-west of Cracow. They are nine in number, and all have been more or less explored, with the result that they have furnished clear evidence not only of the contemporaneity of man with some of the later of the extinct mammalia, but also of the continuity of human occupancy

up to Neolithic times. Hearths at various depths, the industrial remains of man and the bones of both ancient and present-day animals, have been abundantly met with in all the caves. Some human bones, including skulls, were also found and submitted to the late Professor Virchow, who pronounced them to have no peculiar interest, as he could not distinguish them from those of the present inhabitants of the district. Dr Römer (*The Bone Caves of Ojcow in Poland*, translated by J. Ed. Lee, 1884) thus writes about the contents of the mammoth cave :—

Mammoth Cave.—"The human implements found in this cavern are of great variety and of more especial interest than those found in the other caves of the district. The most numerous are the cutting flint implements, made solely by hammering; after these in number come the implements which after having been struck off by a blow have had more work bestowed upon them. Some of these may be specially mentioned as having on the sharp edge teeth like a saw. In all Count Zawisza found in this single cavern about two thousand flint implements. . . . The implements and ornaments made of bone, horn, and ivory were also plentiful, amongst which may be mentioned more especially borers and smoothing implements; there were also teeth of the cave-bear, wolf, fox, and elk, perforated at the root end so as to be worn apparently on a string. The bones of different animals, more particularly of the mammoth, the rhinoceros (*tichorhinus*), the horse and the ox, were used for making sharp chisel-shaped tools. But the most remarkable specimens were those made of ivory; they were of different kinds, and seem to have been rather ornaments than tools. The most curious were some narrow staves or poles, compressed at the sides and sharpened at the end, so that the shape was that of a lancet or a fish (Pl. XXIX., No. 2). Six or seven of these staves were found. The largest is 1 foot long and $1\frac{1}{2}$ inches wide in the middle. Some of these staves were dug up in my presence by Count Zawisza, in a bed with charcoal cinders, several feet deep, below the surface of the deposits forming the floor of the cave. Rough flint implements, and bones of the reindeer, the wolf, and the polar fox were also found in the same bed."

Among the ivory ornaments were small pieces of an oval form perforated with a round hole at the small end (No. 9); a flat-shaped piece $1\frac{1}{2}$ inches long, perforated with two circular holes, and ornamented with eight rows of circular hollows (No. 10); a piece about the length of the finger, perfectly round and pointed at both ends (No. 11); also a large rib of the mammoth, 46 centimetres long, and carved at one end so as to form a handle. Dr Römer goes on to write :—

"Lastly, amongst the indications of human habitation in this cave there were several fireplaces or hearths. They were especially characterised by char-

coal ashes and by hard clay, burnt red. Broken bones of animals and flint implements commonly occurred amongst the charcoal. These hearths were found again and again, one over the other, at different levels of the deposit which covers the whole floor of the cave; this deposit is 2.42 metres thick on the average. In the lowest of the hearths, which was only 10 centimetres above the original rock forming the floor of the cave, reindeer antlers, teeth of the cave-bear, and mammoth bones were observed amongst the charcoal. In a hearth somewhat higher, probably about the middle of the deposit, were found three molars and some bones of the *Rhinoceros tichorhinus*, and also the mammoth rib before mentioned, one end of which had been worked into a handle. In all the other hearths also, bones and teeth of the mammoth were found together with reindeer antlers; and Count Zawisza makes the remark that 'the distinction between an older mammoth age and a more recent reindeer period, as made out from the researches in France, will not apply to these Polish caves.' As a general rule, according to the observations of the above-named naturalist, the mammalian and human remains are found exactly the same through the whole thickness of the deposits covering the floor of the cave. The only thing to be remarked is, that in the lowest bed the remains of the cave-bear were the most abundant; this animal was almost exclusively the earliest mammalian inhabitant of the cave." (*Ibid.*, pp. 12-14.)

The Cave of Jerzmanowice.—This cave from the entrance runs backwards for about 230 metres, and is made up of a series of grottoes connected by narrow passages. It is one of the largest in the district, and also the richest in the remains of extinct animals and of prehistoric human implements. The details of excavations and contents of the débris are very similar to those of the mammoth cave, and it is therefore unnecessary to describe them. Dr Römer in his concluding remarks thus writes:—

"From the foregoing facts it may be considered certain that the cave was for a long course of years inhabited by men of a very low grade of civilisation, contemporary with the cave-bear and the reindeer. Most certainly the intermediate bed between the two charcoal layers, and which was formed slowly, must indicate the period when the cave was inhabited. With respect to the co-existence of man and the cave-bear, a very important fact is that a piece of rock a foot long, taken out of a bed of solid crystalline stalagmite lying several feet deep, contained a vertebra of the cave-bear firmly embedded, and also an undoubted flint implement made by human hands." (*Ibid.*, p. 9.)

A number of objects from this cave (Nos. 3, 4, 6-8, 14-18) are illustrated on Pl. XXIX.

Cave of Kozarnia.—This cave was excavated in the year 1877, for the sake of procuring the cave-earth, which was utilised as manure. The deposits on its floor were from 2 to 4 metres



Bone Caves of Ojcow. (Wierszchow, 1, 2, 9, 10; Kozarnia, 5, 11-13, 19; Jerzmanowice, 3-8, 14-18).
(All $\frac{1}{2}$ real size.) (After Dr F. Römer.)

deep, and consisted of angular pieces of stone mixed with brown earth, the latter being separated from the stones by means of sieves. The cave proved to be very rich both in the remains of extinct animals and in the industrial remains of man (Pl. XXIX., Nos. 5, 11-13, 19). Unfortunately little attention at the time was paid to these relics, and only a small portion of them has been preserved. For descriptive details of a few of the objects found on the three stations above noticed and illustrated on Pl. XXIX., see List of Illustrations.

The archæological phenomena revealed by the excavations of the other six caves described by Dr Römer are very similar. I should have observed that besides objects indicating Palæolithic civilisation there have been also relics of the Bronze and Iron Ages found in nearly all the caves. Among the later objects is a Roman silver coin of the time of Antoninus Pius, probably of the year 140 A.D.

Altogether, it is, in my opinion, impossible to gainsay the general conclusion that the continuity of human occupancy of these caves has been demonstrated, without any interval of time which could be regarded as a *hiatus*.

(4) *The Cave of Ofnet.*

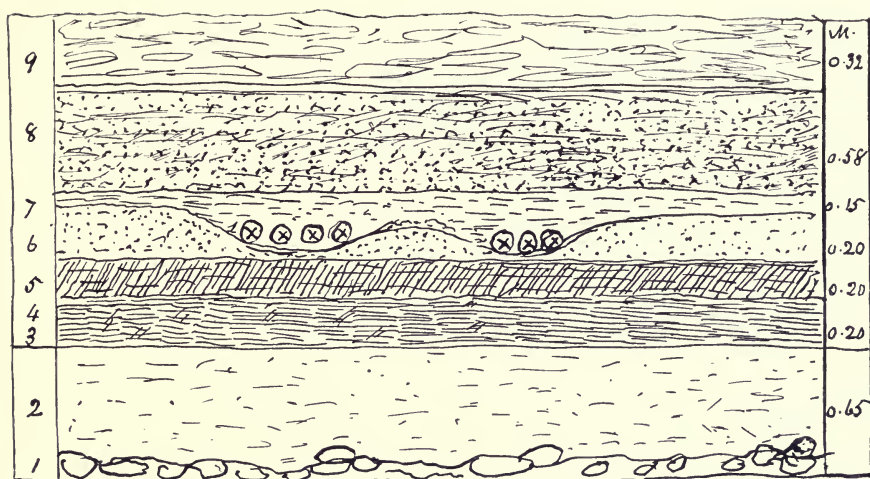
M. l'Abbé Breuil, in searching for evidence in support of his opinion on the position of the Aurignacien phase of culture in the evolutionary stages of Palæolithic progress, gives several interesting accounts of the discoveries of Dr R. R. Schmidt of Tübingen in the upper Palæolithic deposits of Wurtemberg. From one of M. Breuil's articles (*l'Anthropologie*, vol. xx., 1909) the following notes on the cave of Ofnet are taken.

As shown in the accompanying section (Pl. XXX., A), above a depth of 0.65 metre of dolomitic sands (No. 2) containing evidence of having been the haunt of hyænas, there lies a deposit 0.20 metre thick (No. 3), at the base of which bones of the lemming were found. Above this was a stratum (No. 4), also 0.20 metre in depth, which contained evidence of human habitation in the form of typical Aurignacien flint implements, and the no less characteristic pointed bone dart split at the base. The fauna were: horse (very abundant), hyæna, lion, mammoth, woolly rhinoceros, cave-bear, bison, and reindeer

(fully represented). Above the Aurignacien came a typical Solutréen deposit (No. 5) 0.20 metre in depth, containing the well-known laurel-leaf lance-heads worked on both sides, together with a variety of flint implements—scrapers, piercers, burins, etc. Next in ascending order came the Magdalénien stratum (No. 6) with its characteristic flint knives and chisels of reindeer-horn. Its depth was 0.20 metre, and in it were embedded remains of comparatively late fauna, viz., stag, roe-buck, beaver, capercailzie, reindeer, blue fox, mountain hare, goat, and grouse.

The deposits immediately above the Magdalénien contained only remains of stag, elk, and wild boar, those of Arctic origin having apparently disappeared. Its thickness was only 0.05 metre, except in two places where it amounted to 0.20 metre, and filled two hollows dug in the Magdalénien débris and only 1 metre apart. Dr Schmidt was greatly astonished to find in these a number of skulls, ranged concentrically like eggs in a nest. The larger pit measured 30 inches in diameter, and contained twenty-seven skulls. The other was $17\frac{3}{4}$ inches in diameter, with only six skulls (Pl. XXX., B). The skulls in both these artificially prepared pits had their faces turned to the west, and were thickly covered with powdered ochre. There was no trace of any of the other bones of the skeleton. The skulls represented men, women, and children; and all, except those of the first named, were ornamented with necklets made of perforated deer-teeth and shells. The richest necklet had sixty-nine teeth of the red-deer and one hundred shells. About two hundred canine teeth were collected, being part of fifteen necklets, representing, according to l'Abbé Breuil, one hundred stags. The shells could be counted in thousands. A few flints were mixed with the ochre.

Particular notice is taken of the fact that the skulls had been placed in their position before the flesh disappeared, as one or two mandibles as well as a few cervical vertebræ still retained their anatomical position; nor was there any evidence of their having been subjected to fire. Excluding anthropophagy and human sacrifice as a feasible explanation of this remarkable craniological collection, we fall back on the hypothesis that it was a ritual burial—the ochre and the direction of the faces to



A.—Section of the Deposits in the Cave of Ofnet. (After Dr R. R. Schmidt.)



B.—From a photo, showing the Arrangement of the Skulls.

The Sepulture in the Cave of Ofnet (*L'Anth.*, 1909).

the west being points in favour of this idea. No relics were found which could give a clue to the age of this unique interment. Superjacent deposits (Nos. 8 and 9) amounting to a depth of 0.90 metre, and representing the Neolithic period consecutively up to the end of the Bronze Age, would show that it must be assigned to the transition period, or, as Dr Schmidt calls it, Azilien-Tardenoisien. For the report of the excavations of Dr R. R. Schmidt, see *Bericht des Naturwissenschaftlichen Vereins für Schwaben und Neuburg*, 1908.

(5) *The MacArthur Cave.*

The MacArthur Cave was discovered in 1894 by quarrymen while removing stones for building purposes from a cliff facing the bay of Oban, and long regarded by geologists as marking the line of an old sea-beach. It was explored under the auspices of the Society of Antiquaries of Scotland, and a report of the result was read by Dr Joseph Anderson at a meeting of the Society on 11th March 1895 (*Proc.*, vol. xxix.).

The contents of the cave consisted (1) of a superficial layer of black earth, in which human remains were found, including two skulls, showing that its final purpose was a burial-place; and (2) a food refuse-heap composed of shells and the remains of animals, partly superimposed on, and partly intercalated with, sea-gravel. This interesting débris is thus described by Dr Anderson:

“It was found that underneath the layer of black earth there was a bed of shells, varying from 27 inches to about 3 feet in thickness, extending over the whole floor of the cave, and showing little or no intermixture of black earth or gravel, but here and there patches of ashes mixed with wood charcoal, and charred splinters of bone. Under this shell-bed was a bed of fine, clean gravel composed entirely of small water-rolled stones. In this gravel, at the depth of about 18 inches (where the section was first made), there was intercalated a deposit of shells, which we at first spoke of as the lower shell-bed, but which proved to be of partial extent and unequal thickness, thinning out towards the sides and towards the mouth of the cave, and in several places

presenting an irregular or patchy appearance in the section, as if the shells had been deposited in heaps or pockets in the gravel. Underneath this intercalated layer of shells the gravel extended for about 4 feet or more, to the cave bottom, where it was mixed with large and small fragments of loose rock."

Both upper and lower shell-beds were composed of the shells of edible species found on the neighbouring shores,

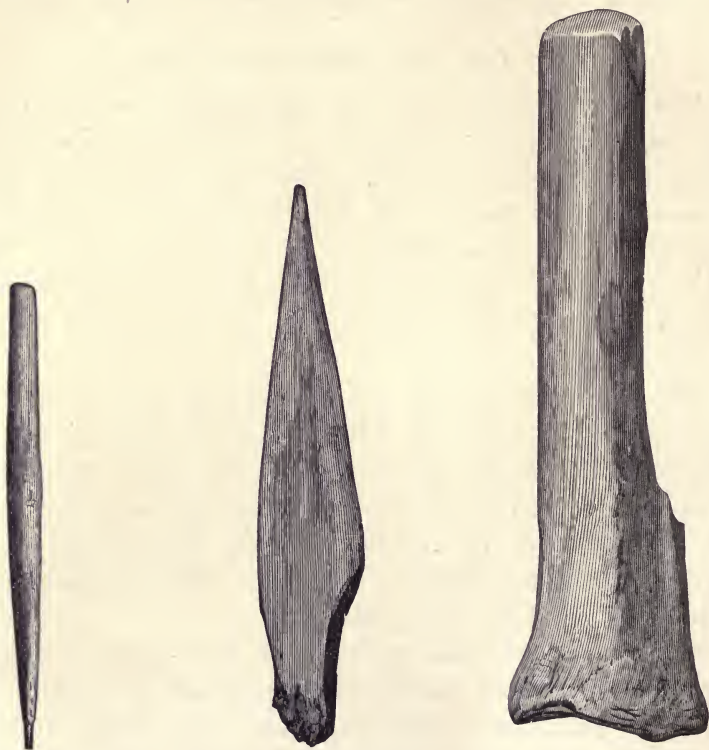


FIG. 110.—Bone Pin ($\frac{1}{4}$).
(Oban Cave.)

FIG. 111.—Bone Imple-
ment ($\frac{1}{2}$). (Oban Cave.)

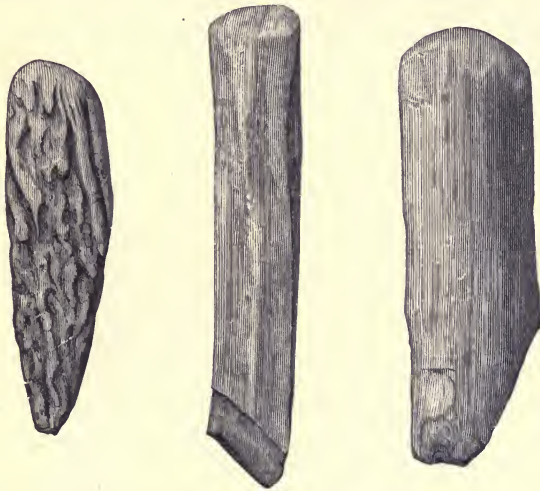
FIG. 112.—Implement made of
Leg-bone of a Deer ($\frac{3}{4}$). (Oban.)

and of the bones of land and marine animals, the entire mass being a true refuse-heap, evidently the result of a lengthened occupation of the cave by people who fed on the fauna represented in it. The bones were for the most part broken into splinters, both for the purpose of extracting the marrow and of manufacturing bone implements, of which a large number was collected. The same shells and bones

of the same species of animals, as well as the varieties of bone implements, were found in both the upper and lower shell-beds.

All the implements recovered from the cave were made of bone or deer-horn, with the exception of three hammer-stones, and twenty flints (three being natural nodules), mostly flakes and chips, "a few of which show secondary working, though none are really implements in the same sense of being fashioned and finished."

The bone and horn implements consist of three pins (Fig. 110), three borers (Fig. 111), together with a few bone



FIGS. 113-115.—Implements of Bone and Deer-horn from the Oban Cave (†).

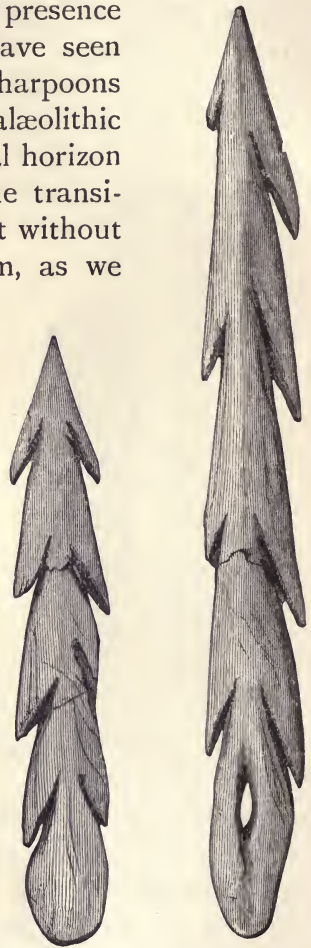
implements of a nondescript character, being merely pointed or flattened at the end; one hundred and forty "round-nosed," chisel-ended implements, having an extraordinary likeness to each other (Figs. 112-115); and seven harpoons (two being entire) made of deer-horn. The larger of the entire harpoons (Fig. 117) is 6 inches long, has four barbs on each side and an oval perforation at the butt-end. The other (Fig. 116) differs from it only in being smaller (4½ inches in length) and having no perforation.

A mere glance at the illustrations of these bone implements, especially the harpoons, shows their striking similarity to those already described from Mas-d'Azil. No archæologist can fail to be astonished at so remarkable a coincidence as that

a group of human relics, from such widely separated localities as Oban and Mas-d'Azil, should be so similar. The harpoons agree, not only in the material of which they are made, viz., deer-horn, but also in the shape of the stem, the method of cutting the barbs, and the occasional presence of an aperture in the butt-end. We have seen that M. Piette assigned the Mas-d'Azil harpoons to an intermediate period between the Palæolithic and Neolithic Ages. Is the chronological horizon of the Oban troglodytes the same as the transition period of Mas-d'Azil? We are not without some suggestive data on this problem, as we shall now endeavour to show.

There is no probable natural phenomenon which more satisfactorily accounts for the intercalation of such a mass of clean sea-gravel between the two shell-beds in the Oban Cave as that, during a storm, subsequent to the time when the cave had become a place of resort to man, the waves were forced into the cave, carrying with them a certain amount of shingle, which, after the abatement of the storm, had become the habitable floor of the cave, and over which the cave-dwellers again took up their quarters.

If this deduction be correct, the importance of the Oban discovery cannot be over-rated, as it proves that man was an inhabitant of the district when the opening to the cave was on the sea-beach, and sufficiently near the water to permit the waves to enter it during a storm. The beach of to-day is, however, 100 yards distant, and the lower shell-bed lay fully 30 feet above present high-water mark; so that a change in the relative level of sea and land, to the extent of some 25 or 30 feet, must have taken place in that part of Scotland, since



FIGS. 116 and 117.—Harpoons made of Deer-horn, from Oban Cave (2).

the troglodyte hunters of Oban feasted on the marine and land fauna of the district. But this is not the only evidence to prove that Scotland was inhabited by a race of people who manufactured implements of red-deer horn, and lived on shell-fish and such marine animals as chance or strategy brought within their reach, before the last land elevation took place. Implements of deer-horn, associated with the skeletons of whales, have been found in various parts of the valley of the Forth—localities which at the present time are the most highly cultivated in Scotland. The following is a brief report of these remarkable discoveries:—

(6) *Early Man in the Forth Valley.*

On 17th September 1889, Sir William Turner read a paper at the British Association, then held at Newcastle-on-Tyne, "On implements of stag's horn associated with whales' skeletons found in the Carse of Stirling." In this paper the author describes a perforated horn implement shaped like a hammer-axe head, 11 inches long, and $6\frac{1}{2}$ inches in its greatest girth

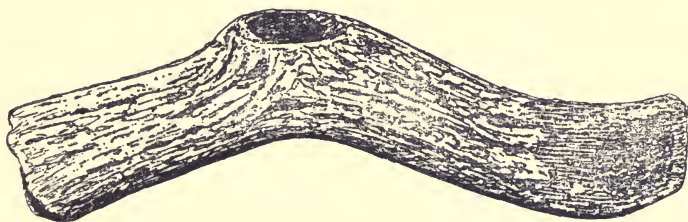


FIG. 118.—Hammer-axe Head of Stag-horn, found with a whale's skeleton at Meiklewood, near Stirling ($\frac{1}{4}$).

(Fig. 118). It is truncated at one end and bevelled into a cutting edge at the other, the perforation being not in the middle, but about 2 inches nearer the truncated extremity than the cutting edge. When found there was still a portion of a wooden handle in the hole. It was discovered in 1877, resting on the skull of the skeleton of a *Balænoptera*, exposed in the course of drainage operations on the estate of Meiklewood, a few miles west of Stirling.

It is recorded that in 1819 and in 1824, implements of deer-horn, two of which had been perforated with a round hole, as if for a handle, had been discovered, along with the skeletons

of whales, but they appear to have been lost. Sir William sums up his interesting report on these discoveries as follows :—

“The discovery of those implements proves that, when the fertile land now forming the Carse of Stirling was submerged below the sea level, the surrounding highlands were inhabited by a hardy Caledonian race, who manufactured from the antlers of the red-deer useful tools and weapons. I have already stated that there is nothing in the form of these implements to lead one to suppose that they could be used in the chase of the whale as lances or harpoons. It is probable that the whales, by the side of which they were found, had been stranded during the ebb of the tide, and that the people had descended from the adjacent heights, and, with the aid of their chisels of horn, had spoiled the carcase of its load of flesh and blubber. In support of this view, I may state that the three skeletons along with which the implements were found were lying in proximity to the edge of the Carse-land, where it approached the adjacent high ground.”¹

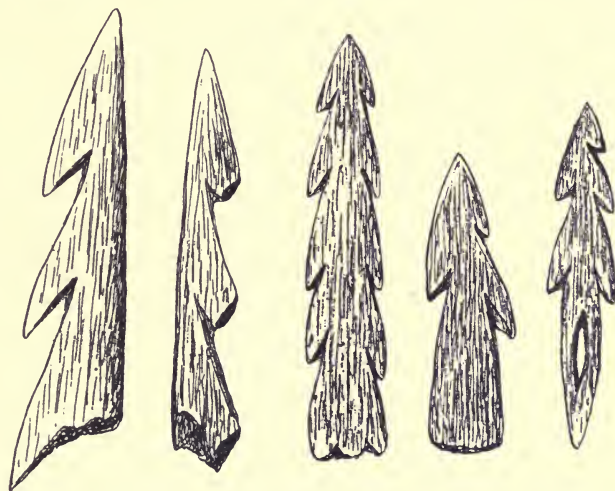
As further evidence that prehistoric man wandered about the shores of these old inland seas, several shell-heaps have been observed along the bluff of the old shore-line on both sides of the Avon, just where it enters the Carse, a locality which is still called Inveravon, although the present mouth of the river is several miles distant. The following extract from *Memoirs of the Geological Survey* (sheet 31) gives a description of one of these shell deposits :—

“A section,” writes Dr Peach, F.R.S., “across a heap, 50 yards long by 20 wide was exposed in a road cutting, and showed many successive layers of shells—principally oysters—to a depth of 3 feet without the bottom being visible. The remains of fire-places were plentiful among the shells. Oysters seemed to have been preferred by the makers of the midden, though they had also used *Anomia*, the big ‘horse mussel’ (*Modiola*), the common mussel (*Mytilus edulis*), the whelk (*Buccinum undatum*), and periwinkle (*Littorina littorea*). Fragments of the large edible crab (*Cancer pagurus*) were also present. All the valves of the oysters were separate, except such as had been empty, and which still had barnacles and zoophytes in their interior. The mussel and other shells were found in separate nests, and not indiscriminately throughout the mound. Layers of sand were also found among the shells. All the middens observed occur on the bluff itself, or just at its base, as if, when it was the limit of high water, the people who formed the middens, after searching the shores during low water, had retreated thither to enjoy their feast while the tide covered their hunting ground. Few or no oysters are now found in the Forth above Borrowstounness.”

¹ To those who wish to know further details of the discovery of these Carse whales, I recommend an article on the subject by Mr David B. Morris, in which he gives the records of ten other whale remains. The article was published in the *Proceedings of the Stirling Natural History and Archaeological Society* for 1892. See also *Prehistoric Scotland*.

(7) *The Rock-shelter of Druimvargie.*

In 1898 another discovery was made at Oban, which yielded remains of human industry associated with a shell-heap and broken bones, precisely similar to those from the MacArthur Cave. This was a shelter situated at the base of a steep rock, called Druimvargie, and overlooking a marsh in which, some years ago, the remains of what were supposed to be a lake-dwelling were found. As the lowest portion of this marsh is only a few feet above high-water mark, it would have been an



FIGS. 119-123.—Harpoons from Druimvargie, Caisteal-nan-Gilleann, and Newcastle-upon-Tyne (3).

inland bay when the sea stood so high as to wash the entrance to the MacArthur Cave, so that the two stations would then have been on opposite sides of a small bay and, probably, be frequented by the same body of hunters. The floor of the shelter stood 34 feet above datum line, and its area measured some 10 feet square. The débris of human habitation and food-refuse which became exposed on its floor had been covered over for ages by a deep talus. It was while clearing away this talus, preparatory to laying the foundations of a house, that the shell-heap and its relics were discovered. Among the relics were a few stone implements of water-worn pebbles, of an elongated shape and slantingly abraded at one end, two or three bone borers, a portion of a deer-horn broken

across a circular perforation, a number of "round-nosed," chisel-ended implements of bone, and the front portions of two harpoons, also of bone, but of the same type as the horn harpoons from the MacArthur Cave—differing from them only in having the barbs on one side (Figs. 119 and 120). M. Piette also records unilateral-barbed harpoons from the cave of Mas-d'Azil, and they are fairly common on the later Palæolithic stations, though made of reindeer-horn. Hence the discovery of this variety at Oban only strengthens the remarkable analogy between these French and Scottish harpoons.

(8) *Shell-heaps in Oronsay.*

Caisteal-nan-Gilleann.—Bone harpoons and implements of bone and stone, similar to those from the MacArthur Cave and the Rock-shelter of Druimvargie, have been found in a shell mound known as *Caisteal-nan-Gilleann*, in the island of Oronsay, explored by Mr Symington Grieve and Mr William Galloway. The results have been described by Mr Grieve in his work on *The Great Auk, or Garefowl*; and by Dr Joseph Anderson in the *Proceedings of the Society of Antiquaries of Scotland* (vol. xxxii.), after Mr Galloway's collection had been acquired for the National Museum. *Caisteal-nan-Gilleann* is (or was) an isolated mound between a range of sand-dunes and the sea, measuring about 150 feet in diameter, and an average height of 25 feet. Its surface was covered with grassy turf, having blown sand underneath to a depth of from 1 to 5 feet. "Below this covering," writes Dr Anderson, "an accumulation of shells and bones, in a series of layers, mingled with sand and ashes, extended downwards for a total depth of about 8 feet. Underneath this refuse-heap the substance of the mound consisted of blown sand in layers, the upper part of each line defined by a thin line of dark mould, with a few sea and land shells intermixed, but no implements or other remains of human occupancy."

The bone and horn implements found in this shell-heap consisted of eleven harpoon-heads (Figs. 121 and 122), three bone awls, and no less than one hundred and fifty of the round-nosed, chisel-like implements, similar to those from the caves of Oban. The stone implements, numbering over

two hundred, were elongated water-worn pebbles, worked at one end into the "round-nosed ending," so characteristic of both the stone and bone chisels. They are supposed to have been utilised by the people who formed this shell-heap as "limpet hammers." Besides the above-named objects there were eight fragments of perforated implements of deer-horn, and others roughly cut round the circumference and then broken across; two small anvil-stones measuring about 4 by 3 inches, and $1\frac{1}{2}$ inches thick; fifty chips and splinters of flint, but none that can be called a worked implement. With the exception of bones of the Great Auk, the organic remains were those of the existing fauna of the west coast, among which may be specially mentioned—red-deer, otter, wild-boar, marten, grey and common seal; remains of one or two cetaceans; Great Auk, now extinct in Scotland; limpet, pecten, oyster, cockle, crab—all evidently used for edible purposes.

Other Shell-heaps.—We are informed by Dr Anderson that two other shell-heaps had been excavated by Mr Galloway, in Oronsay, in which were found bone and stone implements, having the same features as those of Caisteal-nan-Gilleann. One of these stations was called *Croch Sligach*, i.e., the shelly mound, and the other *Croch Riach*, or grey mound. Among the relics from the former were thirty-six of the round-nosed chisels of bone and deer-horn, one hundred and fifty oblong water-worn pebbles with abraded ends, nine rounded pebbles, indented in the middle, supposed to be anvils, and ninety flint chips. It has been noted that the limpets here were exceptionally large, and that some of them were perforated, probably caused by the blow of the implement used to dislodge the mollusc from the rock. The *Croch Riach* collection contained twenty of the round-nosed chisels, fifty stone implements with the usual abraded and slanting ends, and some forty flint chips.

(9) *Shell-heap on Inchkeith.*

Dr T. B. Sprague exhibited, at a meeting of the Scottish Natural History Society in 1898, a large quantity of broken bones found in a shell-heap or kitchen-midden, on the island of Inchkeith, near Edinburgh, among which were a few of the round-nosed bone chisels similar to those found on the shell-

mounds of Oban and Oronsay. Being present at the meeting, I took the opportunity of directing the attention of the members to the significance of this fact.

(10) *Sporadic Finds of Harpoons in Britain.*

Victoria Cave, near Settle.—A harpoon (Fig. 124), of the same type as the Oban specimen, was found in the Victoria Cave, with regard to which Professor Boyd Dawkins thus writes :—



FIG. 124.—Bone Harpoon,
from Victoria Cave (§).
(From Boyd-Dawkins' *Cave
Hunting*.)

“At the entrance the dark Romano-Celtic or Brit-Welsh stratum lay buried, as we have seen, under an accumulation of angular fragments of stone which had fallen from the cliff. It rested on a similar accumulation, which was no less than six feet thick, and at the bottom of this, at the point where it was on a stiff grey clay, a bone harpoon (Fig. 124) was discovered, as well as charcoal; a bone head, three rude flint flakes, and the broken bones of the brown bear, stag, horse, and Celtic shorthorn (*Bos longifrons*). The harpoon is a little more than three inches long, with the head armed with two barbs on each side, and the base presenting a mode of securing attachment to the handle which has not before been discovered in Britain. Instead of a mere projection to catch the ligatures by which it was bound to the shaft, there is a well-cut barb on either side, pointing in a contrary direction to those which form the head.” (*Cave Hunting*, p. 111.)

Newcastle-upon-Tyne.—On the occasion of a visit to the Antiquarian Museum at Newcastle-upon-Tyne, I saw a bone harpoon (Fig. 123), labelled as having been picked up on the shore at Whitburn in 1852. It is of the flat type, has three barbs on one side and two on the other, and contains an oval perforation at the butt-end—in all these respects it agrees with a specimen from Mas-d’Azil.

Kirkcudbright.—On 21st September 1900, I happened to visit a small local museum in the town of Kirkcudbright, and there observed a specimen of a harpoon made of deer-horn (Fig. 125, No. 1), which, I was informed, had been found in 1895 in the bed of the river Dee; but, otherwise, it is

without a history. It bears a striking resemblance to one of the harpoons from Caisteal-nan-Gilleann (Fig. 121).

(11) *Distribution of Neolithic Harpoons.*

Harpoons made of stag-horn have been found in many of the lake-dwellings of Switzerland, especially those of the Stone Age, a few of which are figured in the various works



FIG. 125.—Harpoons of Stag-horn,—(1) From the bed of the river Dee, near Kirkcudbright; (2) from the lake-dwelling of Concise; (3) from *Palude Brabbia* (Italy) ($\frac{1}{2}$). (From sketches kindly supplied by W. C. Watson, author of *Portuguese Architecture*.)

treating of lacustrine archæology. Two interesting specimens are here figured (Fig. 125, Nos. 2 and 3); the former, found on the lake-dwelling of Concise (Lake Neuchâtel), is perforated at the butt, and the other, from *Palude Brabbia* (in the Varese district), exhibits the peculiarity of having the two lower barbs

reversed, like the harpoon from the Victoria Cave (Fig. 124), already described. Another very large specimen was found in the débris of a lake-dwelling at Steckborn, in the Untersee, which has two notches at the butt-end, one on each side, evidently intended for the purpose of giving a catch-hold to the string. Among the other objects from Steckborn lake-



FIG. 126.—Harpoon of Deer-horn from Lattringen (1).

dwelling was a hunter's whistle, made of the phalangeal bone of the foot of a deer, precisely similar to those so frequently found on the Palæolithic stations of France. The harpoon and whistle are figured in *The Lake-dwellings of Europe* (fig. 28, Nos. 18 and 19). Both these objects must therefore be regarded as transition links between the two civilisations. I am not aware of any argument against the supposition that the Reindeer people have survived on a few stations till the early Neolithic people had founded some of their lacustrine settlements. In the examples of harpoons found on the Swiss lake-dwellings the barbs are generally on both sides, and they vary in number from two to twelve, as in Fig. 126, which was found at Lattringen.

Dr Keller gives illustrations of harpoons from Mooserdorf (*Lake-dwellings of Switzerland*, pl. v., fig. 3), Wauwyl (*ibid.*, pl. xx., fig. 26), Lattringen (*ibid.*, pl. xlii., fig. 1), and Concise (*ibid.*, pl. ciii., figs. 26 and 27). A number is figured in *The Lake-dwellings of Europe*—one (out of about twenty) found at Cortaillod (fig. 10, No. 8), another from Baldeggersee, being one of four in a small museum at Lucerne (fig. 16, No. 7), a third from the Untersee (already referred to), and a fourth from Maestricht (fig. 94, No. 3). The latter, a fine specimen with twelve barbs, was found on an artificial island constructed of timbers in the valley of the Meuse; and associated with it were a number of other weapons of bone and horn—all of early Neolithic types. One is a perforated piece of stag-horn bearing a close resemblance to

the axe-hammer head found with the skeleton of a whale in the Carse of Stirling (Fig. 118.)

Harpoons similar to those from the Oban district, but mostly made of bone, have been largely found on the coast kitchen-middens of those primitive camping-grounds called *Rinnekalns*, on the south shore of the Gulf of Finland. At an exhibition of antiquities at the Tenth Archæological Congress, held at Riga in 1896, a large number of both bilateral and unilateral harpoons were exhibited (Catalogue, pl. i.) from the *Rinnekalns*, and associated with them were various other worked objects of bone, such as needles, awls, pointers, etc., but very few stone implements. Among the food-refuse and osseous remains the following fauna were represented: Various kinds of shell-fish, elk (*Cervus alces*), stag, roe, *Bos primigenius*, wild boar, otter, beaver, badger, fox, dog (*Canis familiaris*).

Two fish-spears of a very remarkable character are figured in *The Lake-dwellings of Europe* (fig. 30, Nos. 3 and 5). They were found on the station of Bodmann, in the Ueberlingersee. Their peculiarity is that one has two prongs, and the other four, formed by cutting away the interior of a thick portion of stag-horn, as well as portions of the circumference, so as to leave the prongs in the solid, each prong having only one barb. Harpoons of bone and horn, with only one prong and one barb, have been occasionally met with; but such instruments were not common until metals were introduced and utilised in the manufacture of all kinds of cutting implements. Examples made of bronze were among the relics fished up at Peschiera in Lake Garda (*Lake-dwellings of Europe*, fig. 64, Nos. 20, 21, 30).

(12) *Rock-shelter of Schweizersbild.*

We now come to the post-glacial deposits of the Schweizersbild which have yielded to their excavator, Dr Nüesch, not only relics of the hunters who frequented it, but remains of the animals on which they feasted, in sufficient abundance to enable experts to make out a complete list of the ordinary fauna of the period. It has been shown that, during the occupancy of this rock-shelter by man, there had been a

gradual transition from an arctic to a temperate climate. The contents of these deposits indicate that the locality had been a constant rendezvous for bands of roving hunters from the Palæolithic period down to the Bronze Age. As I have elsewhere described the discoveries made on this station (see pp. 77-82), it is now only necessary to state their bearing on the supposed chronological gap between the two periods.

From the facts disclosed by the investigation of the Schweizersbild it will be seen that in this part of Switzerland there had been no discontinuity in human existence since the inhabitants hunted the reindeer and other arctic animals till the present day. It would appear as if they had gradually adapted themselves to the changes in the environment, passing insensibly from a climate of sub-arctic severity, with its special flora and fauna, to that of modern times. Harpoons of reindeer or red-deer horn are not conspicuous objects among the relics, but this may arise from provincialism, as separate districts often develop peculiar methods of living and hunting. The relics from other transition stations are found to be equally variable in their facies; but this only shows that in the struggle for existence the various communities were shaping their own destinies.

(13) *Moulin des Liesberg and Bellerive.*

In the valley of the river Birse, which falls into the Rhine at Bâle, railway operations have brought to light two stations, one at Moulin-de-Liesberg, between Delémont and Laufen, and the other at Bellerive, between Soyhière and Delémont. In both these the flint implements were characteristic Magdalénien types, but while in the former the reindeer was still feebly represented, in the latter the stag had entirely supplanted the reindeer. The red-deer has had a long range of existence during the whole of the Pleistocene period, and it appears to have increased at the end of the Palæolithic Age, while the reindeer was decreasing in numbers, till it finally became extinct in Central Europe during the transition period which ushered in the Neolithic culture. M. de Mortillet observes that at Les Eyzies, where the reindeer was abundant,

the stag was rare; at Massat (Ariège) both were equally common; at Aurensan and Lorthet (Hautes-Pyrénées) the stag was more abundant than the reindeer; in the Cave of Hoteaux (Ain), where there were six archæological strata, the reindeer-bones were gradually being replaced by those of the stag; and in the Cave of Tourasse (Haute-Garonne) along with 500 molars of the stag there were only two reindeer teeth. (*Le Préhistorique*, pp. 405, 654.)

(14) *Hut-dwellings at Campigny.*

Among the archæologists who did not agree with the theory that the old indigenous inhabitants of Central Europe, along with their flint and bone industries, had come to an end with the disappearance of the reindeer, was Dr Salmon, who maintained that traces of a gradual transformation were to be found on many of the earlier Neolithic sites. In 1898 an important article, entitled *Le Campignien*, under the joint names of Philippe Salmon, D'Ault du Mesnil, and Capitan, was published in the *Revue de l'Ecole d'Anthropologie* (p. 365 *et seq.*), the object of which was to show that certain hut-dwellings excavated at Campigny belonged to the earliest phase of the Neolithic period. The worked flints were numerous and varied, including several Palæolithic types, such as the Levallois flake, and at least one special implement, called *le tranchet*, which the authors regarded as characteristic of the period. Analogous remains were stated to have been found in a great many other localities, but, as Campigny was considered the most typical station, I have selected it as most suitable for giving a brief description of this class of evidence against the *hiatus* theory.

The hillock of Campigny is situated about 2 kilometres to the north of the picturesque village of Blangy-sur-Bresle (Seine-Inférieure), and remarkably well placed for natural defence. The sites of the dwelling-huts were circular pits, excavated in Quaternary gravels, and measuring a few yards in diameter and about 4 feet in depth, which in the course of time became filled up with débris; and so their contents were preserved from decay. The industrial relics collected consist of

hearths, remains of stone industry, and fragments of a coarse pottery. Some fragments of pottery are rudely ornamented with cross-lines on quadrilateral spaces, while others indicate perforated handles, or ears. Among the stone relics are small axes, precisely similar to those found in the Danish *kjökken-möddings*, knife flakes, scrapers, etc., but no polished objects. It would thus appear as if the invention of pottery preceded that of the art of giving a sharp edge, by polishing, to a stone implement—a deduction to which the authors direct special attention. There are also some large flat stones showing marks of rubbing, as well as the usual hand-rubbers, supposed to have been used for grinding grain and seeds. The number of separate hearths indicates communal life and a social organisation of some kind. As to the kind of huts which these people constructed, there is no evidence to show. Chronologically the authors recognise this settlement as on the same horizon as the cavern of Mas-d'Azil, and to the phase of Neolithic civilisation it represents they have given the name *Campignien*.

From the relics found in the débris of the huts at Campigny, and illustrated in the interesting paper above referred to, I have reproduced a few specimens of the pottery (Pl. XXXI., Nos. 1-4) and a few flint implements showing three specimens of the tranchet (Nos. 7, 8, and 9), a pick (No. 10), a double scraper (Magdalénien type) (No. 6), and a saw (No. 5), which will give some idea of the culture of the people who inhabited these hut foundations. But archæological discoveries in several other localities are probably equally specialised and as worthy of being regarded as typical of some phase of the transition period, and if all such differences are to be adopted as generic characters there will be no end to the making of transitional epochs. The truth is, that every separate locality practised its own peculiar methods in adjusting its wants and necessities, not only to the progressive changes in the physical environment, but also to the expanding world of intellectuality. Mechanical improvements appeared now and then as sporadic inventions, but, as soon as they were recognised to be a permanent benefit to the community, they were utilised over larger areas and became recognised objects of commerce.



Specimens of Pottery (1 to 4) and Flint Implements (5 to 10)
from the Hut-dwellings at Campigny ($\frac{1}{2}$). (After Salmon, D'Ault du Mesnil, and Capitan.)

A propos to the tranchet, which, as we have seen, is the characteristic implement in the Campigny epoch, M. Georges Romain describes in the *Revue de l'Ecole d'Anthropologie* for 1896 what he regards as an *atelier de Tranchets*, at Coudraie, near Montivilliers (Seine-Inférieure). This factory was situated on the declivity of rising ground and occupied an area of 150 metres by 100 metres. In the course of a few visits M. Romain and a friend gathered some ninety ordinary-sized tranchets, and four small ones (which might be regarded as arrow points ("à tranchant transversal")), together with a number of scrapers, borers, flakes, etc. Two of the tranchets are figured on page 149 of the above-named volume, and they appear to be exceptionally well made. They measure on an average 42 millimetres by 29 millimetres at the cutting edge. According to M. Salmon (*Dictionnaire des Sc. Anthropologique*, p. 807) the tranchet is to be found in great numbers in the plateau stations of the departments of the Aube, Calvados Nièvre, Oise, Saône-et-Loire, Seine-et-Marne, Seine-Inférieure, Yonne, and others. The industrial remains of these stations scarcely advanced to the degree of using the polished stone axes, which are sparingly met with.

The question whether the tranchet is a characteristic implement of the transition period is still the cause of much discussion among continental anthropologists. That it has been found on inhabited sites of the Neolithic Age is universally admitted, but this is no proof that it had not been a special tool before the art of polishing stone implements was invented. In Scandinavia the tranchet, which is a characteristic relic of the kjökkenmöddings, disappeared on the advent of the polished stone axe; but in some other countries it appeared to have survived longer. (For an important discussion on Campignien and Campigny, see *Bull. de la Société d'Anthropologie de Paris*, 19th January 1899.)

(15) *Tardenoisien Flint Industry.*

The existence in various parts of the world of small flint instruments and tools affecting geometrical forms, such as triangle, trapeze, rhomboid, segment of a circle, etc., has been

known to archæologists for some years. This particular kind of flint industry is now regarded as another special link between the Palæolithic and Neolithic civilisations, under the name of *Tardenoisien*, after Fère-en-Tardenois (Aisne), in the environs of which these small worked flints have been abundantly found. They have also been frequently met with both on the later Palæolithic stations and on Neolithic sites. In England they have been found by Mr Abbott in the Hastings kitchen-middens (*Journal of the Anthropological Institute of Great Britain and Ireland*, vol. xxv., p. 122), and by Dr Colley March on Neolithic floors in East Lancashire. Under peat, Dr March came upon the site and débris of a flint factory, with regard to which he thus writes :—

“The most remarkable and characteristic part of his workmanship (‘Neolithic tool-wright’) lay in the production of a number of minute implements, used probably for boring eyes in bone needles, for engraving patterns on shafts and handles, and perhaps for tattooing.

“Tools of flint, so diminutive as these, some of which are only a quarter of an inch long, have, I believe, been found in no other part of the world. But they made other implements in great variety, knives, scrapers, both hafted scrapers and thumbstones, some of the latter being very small, arrow-tips, spear-tips, and, as I think, fish-throttles. Not one of the implements is polished, and there is no trace of the local manufacture of barbed arrow-heads. Neither is there any sign of pottery, or of a knowledge of spinning. We may believe, too, that these early Neolithic men were ignorant of agriculture, that they lived by the chase, and that they clothed themselves in skins as a protection against a severe climate.” (*The Neolithic Men of Lancashire*, etc., p. 12.)

Baron A. de Loë announced at the Monaco meeting of the International Congress of Anthropology and Prehistoric Archæology for 1906 (*Comptes rendus*, p. 423) the finding of characteristic Tardenoisien flints in the Grotte de Remouchamps, sur l’Amblène (Holland), associated with remains of the reindeer.

(16) *A Floating Lacustrine Station.*

For more than half a century the kjökkenmöddings of Denmark have been known as containing the oldest traces of man in Scandinavian lands—among which, singular enough, the veritable tranchet forms a conspicuous relic. Many of the Scandinavian archæologists have long regarded these remains as belonging to an age which preceded the true Neolithic or polished Stone Age. At the meeting of the Congrès Pré-historique de France, held at Périgueux in 1906, M. Georges F. L. Sarauw read a paper, entitled “*Sur les trouvailles faites dans le Nord de l’Europe datant de la période dite de l’hiatus.*”

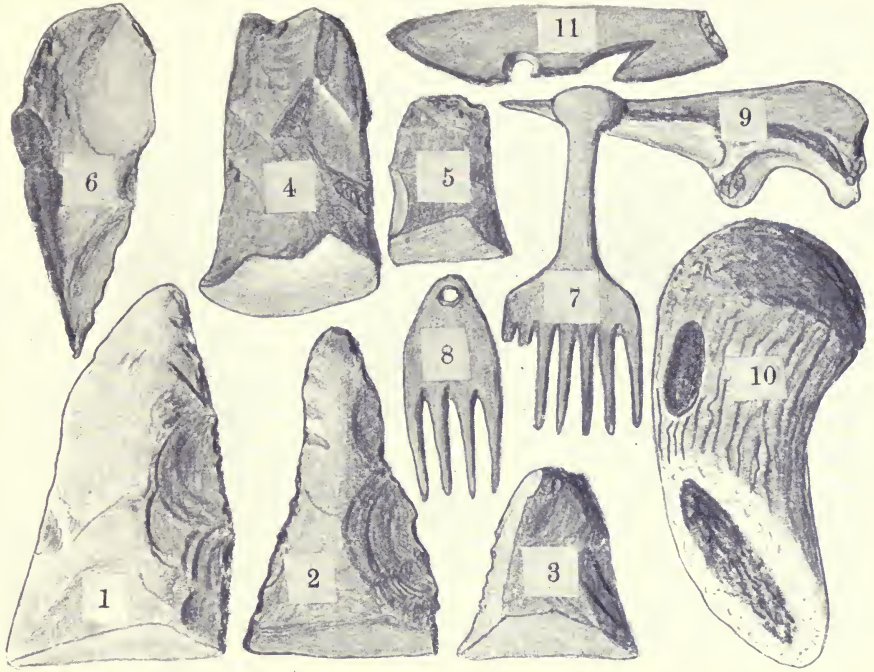
From this communication it appears that in the island of Zeeland a remarkable discovery has been made in a peat-bog (formerly the bed of a lake), called Maglemose, in the form of a lacustrine station, distant several hundred yards from the old shore of the lake, on which were found a large assortment of worked flints, and implements of bone and horn, together with the osseous remains of animals and other food-refuse. The most puzzling feature of the discovery was the entire absence of piles for supporting platforms on which the dwelling huts are usually placed—a peculiarity which could not be due to the decay of the piles, as there was a large quantity of wood well preserved in the moss. The conclusion arrived at was that it was a huge raft, or floating island, and probably the precursor of the famous pile-structures of the Stone and Bronze Ages of Central Europe. Among the flint relics are scrapers, picks, tranchets, borers, flakes, nuclei, etc. But of greater interest are the objects made of bone and horn, such as socketed axes, made of the bones of the urus and of stag-horn, daggers, needles, ornaments, fish-hooks, polishers, and especially sagaies and harpoons made of bone. The latter assume different forms, but the barbs are unilateral—except in a special form which consisted of a smooth stem with a slit on each side, into which thin flakes of flint were inserted. Among the thousands of worked objects of flint collected on this station there was none showing any trace of polish, nor was there a single fragment of pottery found. The archæological horizon of this strange

settlement agreed with that of Campigny in its *tranchets*, with that of Fère-en-Tardenois in its diminutive flint implements, and with that of Mas-d'Azil in its harpoons. On geological grounds, as well as on the evidence of its flora and fauna, it has been placed earlier than the kjökkenmöddings. M. Sarauw, after noticing the distribution of other early remains in the north of Europe, concludes thus: "Ainsi, pour le Nord de l'Europe comme pour l'Ouest, la lacune, l'ancien *hiatus*, vient d'être comblé."

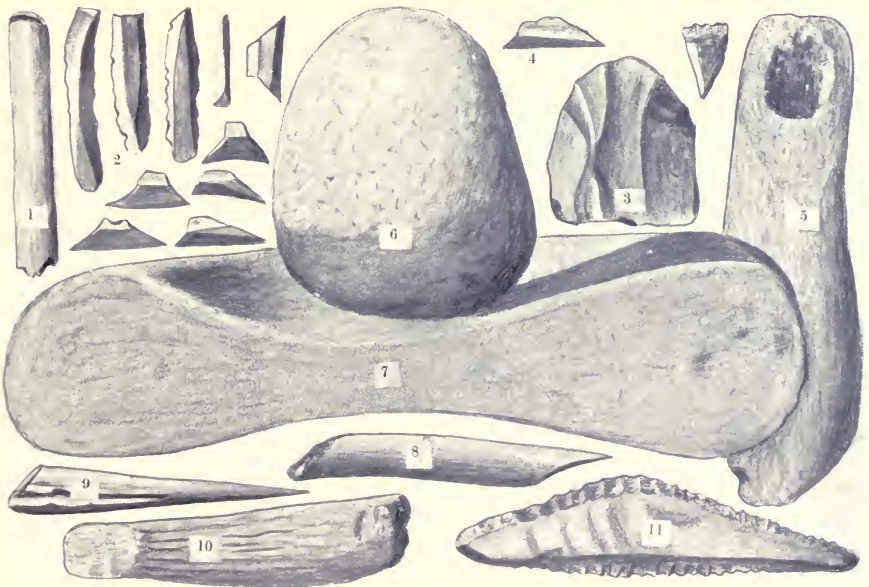
(17) *Danish Kjökkenmöddings.*

Various shell-heaps scattered along the sea-coasts were long known in Denmark, but, being regarded as raised beaches, they attracted little attention till they were discovered to be artificial and to contain relics of human industry. Consequently a committee, consisting of the late MM. Forchhammer, Worsaae, and Steenstrup, three distinguished representatives of geology, archæology, and biology, was appointed in 1850 to examine them. They had scarcely commenced their labours when it became apparent that these deposits were the culinary débris of a population who lived in the Stone Age, and fed largely on shell-fish and such animals as could be procured by hunting. Hence they became known under the name of Kjökkenmöddings—*i.e.* (Anglice) kitchen-middens.

As a few archæological problems were left undecided by the committee, owing chiefly to a difference of opinion between Professors Worsaae and Steenstrup, on the antiquity of the shell-mounds, some of the more recent Danish antiquaries thought it desirable to test the matter by further excavations. Accordingly a second committee was appointed in 1893, who conducted a series of elaborate excavations on eight different sites in Jutland and Zeeland, of which a report was issued in 1900. Among thousands of worked objects of flint, bone, horn (red-deer), wood, and coarse pottery, there were no polished stone axes. The principal stone implement was the *tranchet*, a peculiar form of hatchet similar to those previously found (Pl. XXXII., A, Nos. 1-6). The general result was to confirm the opinion of Worsaae that the



A.—From the Danish Shell-heaps. (Nos. 1-8 = $\frac{1}{2}$; 9 = $\frac{2}{3}$; 10 = $\frac{1}{3}$; 11 = actual size.)



B.—From the Shell-heaps of the Valley of the Tagus (all = $\frac{1}{2}$ real size). (After C. Rebeiro.)

The Kjökkenmöddings of Denmark (A) and of Portugal (B).

[To face p. 280.

kjökkenmöddings belong to the oldest phase of the Stone Age in Denmark.

Over one hundred and fifty of these refuse-heaps are known in Denmark, of which about forty were more or less excavated by the first committee. They are mostly distributed along the shores of the numerous fiords which intersect the country. In Zeeland all the examples are on the Ise-fiord, where about a dozen have been noted chiefly along its inland reaches. But the greatest number have been found in North Jutland—four being on the Lim-fiord, at considerable distances from each other, and nine on the beautiful Mariager-fiord, grouped together about its middle third. The stations of Meilgaard, Fannerup, and Kalævig are located within a peninsula formed by the sea and fiord of Randers, which embraces some of the finest wood scenery in Jutland. In some instances the shell-heaps are situated several miles inland, but in such cases there is good reason to believe that formerly the sea extended to these localities. The site of the one at Fannerup, now some 10 miles from the sea, is on the border of a flat district, known within historical times to have been an arm of the sea which subsequently became a fresh-water lake, but is now entirely dried up. One of the largest and earliest explored is that at Meilgaard, situated in a beautiful beech forest, between which and the sea (some 2 miles distant) there are now high dunes of drifting sand. It measures 340 feet in length and 120 feet in breadth, with a maximum depth of 10 feet.

The most common industrial remains hitherto found on these sites consist of roughly chipped flint implements—hatchets (tranchets), flakes, scrapers, and some angularly chipped nodules (supposed to have been used as slingstones); also a few pointed implements of bone and horn. Only one or two stations have yielded objects which point to an overlap into a more advanced civilisation. In the collection of kjökkenmödding objects in the museum in Copenhagen, I noticed a polished axe and a worked dagger from Havnö, on the Mariager-fiord; and from Havelse there is a flint scraper, evidently made from a portion of a polished celt. Among the relics from Meilgaard are three small combs

with short handles made of bone (Nos. 7 and 8), which remind one of the long-handled combs found in Hunsbury Camp, and in the Glastonbury lake-village (both late-Celtic stations), as well as in some of the Scottish brochs; stout portions of stag's horn, some perforated, appear to have been used as hammers or axes (No. 10); and a few fragments of rude pottery and pointed implements of bone. No. 11 represents portion of a harpoon which reminds us of the harpoons of Piette's Azilian period. As indications of hearths, there are some round stones of granite or sandstones showing marks of fire.

The following animals were identified as having their remains more or less represented:—

1. *Shell-fish*.—The most common were oyster, cockle, and mussel. A few other species were also collected.
2. *Fish*.—Herring, cod, eel, and flounder or dab.
3. *Birds*.—Eagle, cormorant, mew, wild duck, and goose (most common); also swan, capercailzie (*Tetrao urogallus*), and great auk (*Alca impennis*).
4. *Mammalia*.—Stag, roe, and wild boar (most common); also urus (*Bos primigenius*), dog, fox, wolf, marten, hedgehog, otter, seal, porpoise, water-rat, mouse, beaver, wild cat, lynx, and bear (*Ursus arctos*).

It will be observed from this list that, except the dog, the ordinary domestic animals, such as the common barn fowl, domestic ox, horse, sheep, goat, and pig are unrepresented. We have also to note the absence of the mammoth and all the other extinct or emigrated mammalia of the Palæolithic period, including the reindeer, bison, elk (*Cervus alces*), musk ox, and hare. Of special interest among the birds are the great auk and capercailzie, neither of which is any longer an inhabitant of Denmark, nor even a casual visitor to it. The presence of the bones of migratory birds, such as the wild swan, which visits Denmark only from November till March, shows that the kjökkenmöddings were inhabited all the year.

Except ashes, charcoal of a species of pine, and charred remains of some kind of sea-plant, no products of the vegetable

kingdom were found in any of the kjökkenmöddings. The association of pine-charcoal with the bones of the capercailzie in a kitchen-midden—a bird which feeds chiefly on the buds of the pine—suggests that the people who left these remains behind them were contemporary with the pine forests, which, on other substantial archæological evidence, are shown by Danish antiquaries to have flourished in their country in early Neolithic times.

Among Professor Steenstrup's many valuable deductions derived from the organic remains, perhaps the most interesting are those which he founds on the condition of the osseous remains. Thus, all the long bones and those that contained marrow, belonging to the stag, roe, and pig, were systematically broken for their marrow. That they were so treated by the hand of man was proved by the frequent detection of the conchoidal indentations left on the spot where the blow had been struck. On the other hand, the long bones of birds, the shafts of which alone were found in the débris, were not at all broken—a fact which he attributed to their not containing marrow. Again, all the bones, whether broken or not, had their cartilaginous portions more or less gnawed by some kind of carnivorous animal, whose teeth-marks in many instances were still visible. Professor Steenstrup was so much struck at the uniformity with which the identical parts of the same bones always turned up, that he had no hesitation in ascribing the absence of the softer parts to the agency of dogs, whose presence in greater numbers than any other carnivora had already been established by the relatively much larger proportion of their bones. That the disappearance of the soft and juicy portions of the bones was not due to casual visitors was inferred from the fact that the bones through the entire mass were similarly treated. The gnawers of the bones must therefore have been constant companions of the people during all their feasts; and hence the inference that they were a breed of domestic dogs. The Professor further strengthened this important generalisation by proving experimentally that when dogs have free access to the bones of mammals and birds, the portions left are precisely the same as those found in kjökkenmöddings. In

order to make these interesting deductions still more forcible, he constructed diagrammatic skeletons of an ox and a duck, indicating by degrees of linear shading the portions of the bones respectively gnawed by dogs and broken by man. Alongside of the bird skeleton is placed that of a young pigeon (copied from Flourens' work *Sur le développement des Os et des Dents*), showing the portions of the bones which become first ossified. From these diagrams it will be seen at a glance how closely the portions of the bones eaten by dogs correspond with those that become last ossified in the young animal.

(18) *Shell-heaps in Portugal.*

Excluding the caves and rock-shelters frequented by Palæolithic man, only a few inhabited sites, associated with shell-heaps and other food-refuse, can with certainty be assigned to the transition period, although, within recent years, their number has considerably increased. Among the less known of the early haunts of man, one of the most interesting was discovered in 1863, in the valley of the Tagus, near the villages of Salvaterra and Mugem. The shell-heaps are grouped on the left bank of the river at from 25 to 30 metres above sea-level, but distant some 30 or 40 miles from the maritime shores of the present *embouchure* of the Tagus. They are scattered over an area measuring 20 kilometres in length by 5 in breadth. One of these *monticules*, called *Cabeço da Arruda*, had an elliptical shape, and measured about 100 metres in length, 60 metres in breadth, and 7 metres in thickness. A short description of their nature and contents was given by M. C. Ribeiro in 1880, at the meeting of the International Congress of Anthropology and Prehistoric Archæology then held at Lisbon. The shells are of marine origin, and it is supposed that when the shells were gathered and used as food the sea extended up the valley as far as the shell-mounds. The industrial remains disclosed by excavations are of a very rude character, consisting of primitive implements made of flint, quartzite, bone, and horn (Pl. XXXII., B). Among the flints illustrated are a few knife flakes, and some small cutting implements of rhomboidal forms, "à tranchant transversal," reminding one of the *Tardenoisien*

industry (Nos. 2, 3, 4, 11). Also, some large flat stones used apparently for grinding purposes, together with the smaller hand rubbers (Nos. 6, 7). Horn and bone were used as chisels, pointers, spatulæ, etc. (Nos. 5, 8, 9, 10). No polished axes, nor pottery, nor any indications of domestic animals, not even the dog (which the people of the Danish kjökkenmöddings had domesticated), have been found in any of these shell-mounds. The animal remains belonged to the following genera: *Bos*, *Cervus*, *Ovis*, *Equus*, *Sus*, *Canis*, *Felis*, *Meles*, *Viverra*, *Lepus*; and the shells were mostly *Lutraria compressa*, and in a minor degree there were also *Tapes*, *Cardium*, *Ostrea*, *Buccinum*, *Nucula*, *Pecten*, and *Solen*.

Perhaps the most interesting feature of the investigations was the discovery of upwards of a hundred interments, at various depths in the shell-mounds; but it does not appear that any grave-goods had been associated with them. The osseous remains were much decayed, and the skulls distorted, probably by the pressure of the débris. Enough, however, remained to show that they represented two races—one dolichocephalic and the other brachycephalic. Some of the crania were recognised by M. de Quatrefages, and other anthropologists present at the Congress, as belonging to the types of Crò-Magnon and Furfooz. Of the latter, only two specimens were in the series, all the others being dolichocephalic, with a cephalic index of 71.11 to 75.56. One of the brachycephalic skulls had a cephalic index of 86.90. A reasonable inference from these archæological data is that the builders of the shell-mounds in the valley of the Tagus were a mixed community, the great majority of which belonged to the old Palæolithic people of Europe, while the minority formed part of the earliest immigrants of the Neolithic races into Europe.

(19) *General conclusion.*

From these recorded facts and observations we see that, at the dawn of Neolithic civilisation, there extended over Western Europe a primitive population living on shell-fish, the produce of the chase, seeds, fruits, roots, etc., varying according to the natural resources of the environment. The finding of the

foundations of huts in selected localities shows that they lived a communal life; but their domestic economy was of a low order, having only roughly formed implements of stone, bone, and horn. They had no ornaments, no pottery, and no domestic animals, with the possible exception of the dog. But even at this early stage there were two well-defined races apparently living in harmony with each other—one dolichocephalic and the other brachycephalic. The former, who were greatly in excess of the latter in the western regions of Europe, appear to have been indigenous to the country, being probably the direct descendants of the Palæolithic people who, so far as can be judged from the most trustworthy anthropological researches, were all dolichocephalic. The latter, or brachycephals, on their first appearance in Europe were not more civilised than the former, but a constant stream of immigrants was kept up, and ultimately introduced improved methods in the cultivation of grain, and in the rearing of domestic animals. The French troglodytes lived as isolated hunters till the wild animals—mammoth, reindeer, horses, etc.—which formed the staple of their food, died out in the locality, owing probably to a change of climate. Contemporary with them, but outside the areas of their hunting-grounds, these other communities were developing new resources for the supply of the necessities of life among the increasing products of a more ameliorated climate. It is quite possible that certain districts of Europe which were formerly inhabited by Palæolithic hunters ceased, for some reason or other, to be places of resort to man. Britain in Quaternary times was joined to the Continent, and it is probable that its later Palæolithic inhabitants, such as those of Kent's Cavern, could join hands with French troglodytes on the intervening common hunting-grounds now forming the bed of the English Channel. When Palæolithic civilisation began to be curtailed in virtue of cosmic changes in the environment, and new methods of living were forthcoming, it is possible that the British fringe of the Palæolithic population would shrink back to Europe, and thus, for a time, leave a gap in the continuity of human life in Britain. On this point there is no evidence; but it is only a side issue to the European *Hiatus-problem*.

The power of adaptation to changed circumstances may almost be regarded as a monopoly of the human race, and no doubt it took effect in a variety of ways in different geographical areas. We could hardly expect to find in every locality precisely the same *facies* in the progressive arts and industries. Something must be due to the *genius loci*, and the inventive faculty of individuals. Hence the archæological *hiatus*, so far as the present European continent is concerned, like the geological cataclysms of the days of yore, must be relegated to the lumber-room of dead theories.

PART II.—PREHISTORIC ARCHÆOLOGY

TERREMARE, AND THEIR RELATION TO
LACUSTRINE PILE-STRUCTURES

CHAPTER XII

THE DISCOVERY AND STRUCTURE OF THE TERREMARE

Introductory. Early Opinions on the Terremare. Report of Strobel and Pigorini. New School of Archæology. Special Investigations at Castione. Castellazzo de Fontanellato. Rovere di Caorso. Montata dell' Orto. Characteristics of a Typical Terramara.

BRITISH archæologists are not particularly well acquainted with the terramara settlements of the Po Valley, which form the larger portion of the subject matter of the second moiety of the present course of lectures. It is not, however, specially for that reason that I have selected it, but rather for the fact that the long series of researches, which gradually led to the elimination of the terremare from the category of the unknown to that of the known, forms a valuable object-lesson, not only of the dangers and pitfalls incidental to archæological investigations, but of the triumphs that can be achieved by conducting operations on scientific methods. The early history of terramara research is a succession of lively discussions, preconceived theories, and hasty generalisations, applied to the elucidation of phenomena of a novel and obscure character, at a time when the chronological sequence of archæological materials had not yet been well understood. The art of correctly interpreting such waifs and strays of the culture and civilisation of past humanity which survive to our time is, under the most favourable conditions, surrounded by many inherent difficulties. Nor can it be truly said that its votaries are yet completely emancipated from the influences of the untutored tradition, superstition, and dilettantism which, some half a century ago, vitiated antiquarian pursuits.

Another reason for the choice thus made is that, since I described the terremare as a mere development of the lake-

dwellings of the Po Valley, now twenty-one years ago, important researches have disclosed new and remarkable features both in their structure and purpose. Hence the necessity of reconsidering the whole subject *de novo*. The story of the terremare will, therefore, be told from the beginning of the earliest speculations down to the present time; and it will be the lecturer's fault if the details are not interesting and instructive. As to the pile-structures, only a few stations have been discovered and investigated subsequent to 1890, the date of the publication of the *Lake-dwellings of Europe*. These will be briefly described, thus bringing my original notice of the pile-structures of the Po Valley, whether in water or on land, up to date.

Early Opinions on the Nature of the Terremare.

Shortly after the middle of the eighteenth century certain artificial deposits of an earthy substance in the form of large, flattish mounds, scattered over the provinces of Parma, Reggio, and Modena, became known to agriculturalists as possessing great fertilising power—a property which they henceforth turned to advantage by using their contents as field manure. To such an extent has this practice been carried that many of these deposits, notwithstanding their great extent, covering in most cases many acres, have now almost entirely disappeared. These so-called marl-beds consist of a mixture of clay, sand, ashes, etc., arranged in strata of different colours—yellowish brown, green, or black—and are known among the peasants under the name of *marna* or *merne*; but in scientific circles they are generally called *terra mara*, more especially since the meeting at Bologna, in 1871, of the Congrès International d'Anthropologie et d'Archéologie Préhistoriques. In the course of their annual excavations for this fertilising soil the workmen turned up various objects of antiquity, such as Roman coins and tiles; implements of bone, horn, and bronze; and the bones of domestic and wild animals. Even human remains were occasionally met with. But these popular observations failed to lead to any scientific investigation, and when these mysterious mounds happened to be noticed by the early writers of last century each had a theory of his own to account for them.

Thus the celebrated naturalist Venturi, in his *Storia di Scandiano*, published in 1822, assigned them partly to the Boii, a Celtic race who here, according to him, cremated their dead warriors and ceremoniously threw their weapons and animals taken in war into the burning pile; and partly to the Romans, who subsequently inhabited the country, and selected these heaps for their dwellings and burial-places. Others supposed them to be the sacred or traditional cemeteries of successive races, and hence their contents were called cemetery earths (*terra cimenteriale*); and it is a curious fact that many of these truncated mounds are to this day crowned by a modern church or convent, around which the Christians have been in the habit of burying their dead. The following report by Sig. Gramizzi, on the marl-bed of Salso Maggiore, gives an idea of the theories then current on the subject:—

“The marl-bed in question is situated in the borough of Salso Maggiore, 4 miles distant from Borgo San Donnino, to the right of the road which leads from Borgo to Salso. It is upon a hill; I have not been able precisely to ascertain its extent, the marl earth being found in different positions; the extent of the excavation from which the majority of the earth is extracted is about 400 metres square, the depth to which it reaches is 1.50 metres, which is visible in the place where at present excavation is made. In some situations the *marna* is found on the surface of the ground, in others under a sandy stratum of 0.50 metre in thickness. There are found at various depths charcoal, bones of men, many bones of animals; indeed of these there are so great quantities that the excavators in winter collect them and burn them to warm themselves. Elsewhere are excavated fragments of earthen vases, pins, and lance-points of bronze, and many coins, nearly about the size of our centessimi. At 300 metres distance from the marl-bed runs the torrent Gerra. With regard to traditions, I have found the following in a little work of a certain Professor Ghiozzi Borghigiano, who, wishing to prove that Borgo San Donnino had been built on the ruins of the ancient Fidentia, thus expresses himself:—

“To give weight to the opinions I have expressed, I bring to the recollection of the courteous reader, that on the hills of Bargone, situated in the quarter of Valle, at some little distance to the right of the torrent Stirone, and 4 miles from Borgo San Donnino, there is a place commonly called “Terra Marna,” on the road to Salso Maggiore, which would imply a sediment of the sea; but this term seems improperly applied, since it is proved that in such a place the nations met to make their sacrifices in the most remote pagan times, that is, the Etruscans, the Galli Anani, and Galli Boi, and afterwards the Romans who inhabited our plains; since there are found in great plenty in this mound of earth, rendered fertile by the slaughtered victims, and in the strata of ashes, as it were saponaceous, which are in the midst of it, all the instruments employed in sacrifice, such as axes (single and double), short swords, knives,

daggers, long skewers made of wood and metal, clay vases in which they burnt perfumes, besides various interesting objects in gold, laid bare in such a manner that they have exported more than 4000 cubic quadretti of this earth, whence one may suppose without being far wrong, that in that vicinity there was a considerable population of the city which there, for many centuries, gave worship and honour to the false divinities.'” (B. 30, p. 21.)

Nor did the opinion of Professor Gastaldi, first published in 1861 (B. 4), throw much light on the matter, as will be seen from the annexed extract from Chambers's translation of his celebrated work :—

“It appears to me that the discovery made in 1856 at Cumarola of the forty warriors buried in the same spot, may up to a certain point put us on the way to reach the interpretation of the origin of the marl deposits. I shall premise that all the marl-beds of the territories of Reggio, Parma, and Modena, of which mention is made by Venturi and Cavedoni, are situated in proximity to torrents (an observation which was made to me by Professor Doderlein).

“It is known that the regions in which we meet with these deposits have in past ages been subject to devastating inundations, caused on the one hand by the overflowing of the Po, and on the other by the bursting from their banks of the torrents which, descending from the Appenine, discharge their streams into the Valle Padana. Finally, we know that some of these marl-beds are stratified.

“That being granted, if we here imagine that kind of burial-place discovered at Cumarola in 1856, and another similar one situated at a lower level; in other words, if we imagine a superficial stratum of ashes, carbon, and broken bones—in a word, a stratum, a bed of what has been left at the meetings or funeral feasts of the aboriginal races, cut up, washed and rearranged by the waters inundating the surrounding country, we shall easily understand that there would result from it a deposit very analogous to the circumstances of the marl-heaps, a deposit, that is to say, stratified consisting of sand, clay, and flints, and containing ashes, bones, objects of human industry, etc.; that if in more recent times other inundations should have come successively, so as to deposit new strata, containing, it may be, earthenware and other utensils of the Roman or post-Roman age, the deposit which would result from it would be a marl-bed of the most complicated and perfect kind.

“If from the little, I repeat, which I have seen, and which I have been able to gather from the writers who before me have spoken about these most curious earths, I may be allowed to draw general deductions, it is my opinion that the majority of the marl-beds are remains of the burial-grounds of the Romans, and remains of the cemeteries, funeral piles, and better, of the feasting-places (*kjökkenmöddings*), meeting-places, or stations of the ages of bronze for the most part remodelled by water.” (B. 30, p. 13.)

But these and similar theories based on the supposition that the terramara deposits were the abodes of the dead

were not in harmony with the domestic character of the pottery and implements turned up. The starting-point of a long series of researches which ultimately cleared up the problem was the announcement of Professor Strobel of Parma in 1861 (B. 5), that the remains of a palafitte analogous to those found in lakes and marshes, were to be seen below the true terramara beds at Castione dei Marchesi.

This celebrated and best known of all these settlements is situated about four miles north-west of Borgo San Donnino, in the province of Parma. It was discovered about ninety years ago, and continued to be excavated solely for agricultural purposes till 1861, when Gastaldi's publications on the prehistoric remains of North Italy directed attention to the works of man so frequently disinterred from the terramara sites. Till then the numerous objects of human industry brought to light by the workmen excited little or no curiosity. Things, however, were very different after the Scandinavian wave of archæological inquiry, then greatly quickened by the discovery of the Swiss lake-dwellings, had reached the Parmensian antiquaries. Henceforth instructions were given by the proprietor, Sig. Ugolotti, that all antiquarian objects were to be carefully preserved, and now they constitute a special and most interesting collection in the Archæological Museum of Parma.

On visiting Castione one sees a slight elevation rising about ten feet above the plain, and surmounted by a church and convent. These buildings, which are both lofty and extensive, are approached on the west side by a stone bridge, spanning a canal-like pool of stagnant water, which lies along the margin of the mound and partly surrounds it. Elsewhere the slope from this plateau to the level plain is gradual, except where the more recent excavations have been made, which present much the same appearance as a roadside sand-pit. Of the original size of the mound it is now difficult to form a correct estimate, owing to the amount of stuff yearly carted away, but the portion still undisturbed or covered by buildings may be estimated at two acres.

A perpendicular section, which can be readily obtained at various points, presents the following succession of layers from above downwards :—

- (1) Ordinary mould or disturbed soil for a depth of 6 feet, said to contain Roman and more recent remains.
- (2) The terramara beds proper, arranged in thin, wavy laminations of variously coloured earths. Sometimes a thickish bed of clay or a black band of charcoal catches the eye; in another place an overlapped bed is seen to shelve out and disappear altogether. But, notwithstanding an undulating appearance, the general horizontality of these layers is maintained. Their average total thickness amounts to 8 feet.
- (3) Underneath these beds lies a blackish peaty substance, some 3 feet thick, in which, as already mentioned, Strobel detected the remains of a palafitta. Below this peaty stratum there is a greenish clayey deposit, similar in composition to that found at some depth in the surrounding plain, into which the piles were driven.

Strobel's discovery caused much speculative interest, especially when correlated with the researches initiated by Gastaldi regarding pile-dwellings in lakes and marshes, the existence of which in Italy had just been demonstrated at Mercurago and in Lake Garda.

Report of Strobel and Pigorini.

Reflecting on these novel revelations, and impelled no doubt by the growing interest in such studies, Strobel and Pigorini, both then residing at Parma, commenced a series of observations and inquiries regarding the terremare in their vicinity, the outcome of which was a joint report, first published in 1862 as part of Gastaldi's well-known work already referred to (B. 7).

In this report the authors discussed the works of Man found in the marl-beds, under the following five heads—viz., habitations, vessels, utensils, arms, and things of uncertain use. The pottery they recognised as having degrees of quality according to the uses to which the vessels were put. The larger vases were roughly kneaded, the grains of sand were larger and more visible, and the colour of the paste was ash-black inside

and reddish outside. They had no glaze. The smaller dishes were made of fine homogeneous paste, with very thin walls, smooth surface, and a blackish glaze approaching to varnish. According to their form they might be divided into a great



FIG. 127.—Enzola ($\frac{1}{3}$).

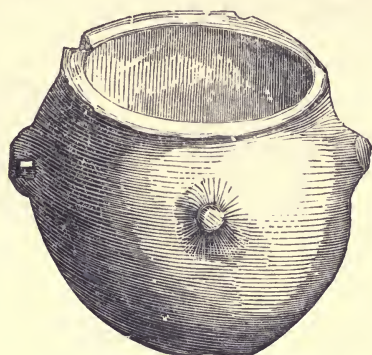


FIG. 128.—Castellazzo ($\frac{1}{2}$).



FIG. 129.—Campeggine ($\frac{1}{2}$).

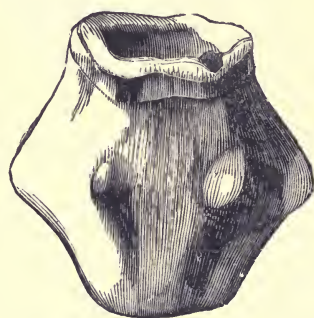


FIG. 130.—Locality unknown ($\frac{1}{2}$).

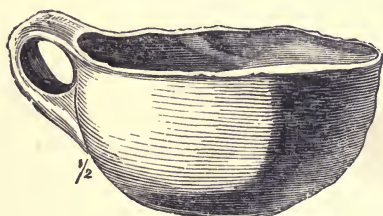


FIG. 131.—Castione ($\frac{1}{2}$).

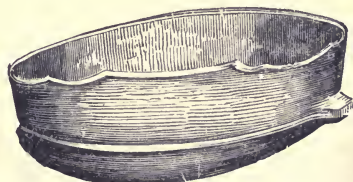


FIG. 132.—Poviglio ($\frac{1}{2}$).

many varieties, as plates, cups, basins, bottles, vases, etc. (Figs. 127-133). In the makers of this pottery the authors recognised an inclination to vary their handiworks, and this was especially manifested in the various forms and different embellishments of the handles, called *appendiculati*, which turned up in large quantities. These were ordinary handles

with an addition on the top, either in the form of an upright button-like process or transverse bar. To the latter the greatest interest was attached, as the ends of the bars were bent in a variety of ways so as to assume the form of ears or horns, as in Fig. 133.

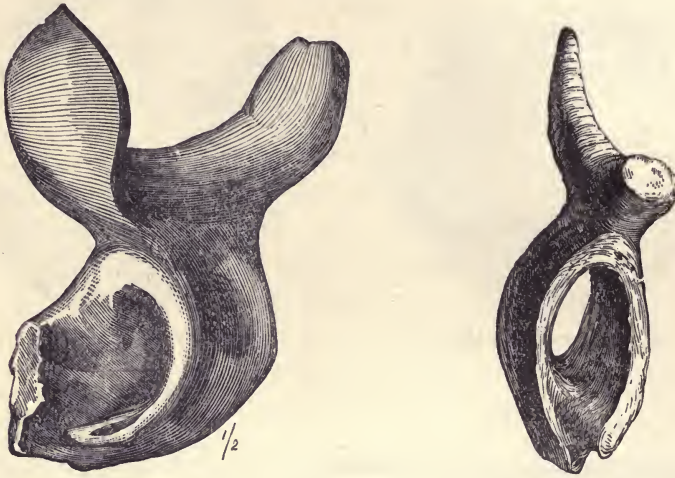


FIG. 133.—Anse Lunate or Cornute, from the Terremare.

Among the utensils they distinguished a variety of industrial objects such as needles, pins, ornamented combs, small wheels,



FIG. 134.—Bone Comb ($\frac{1}{2}$), from Vico-Fertile.

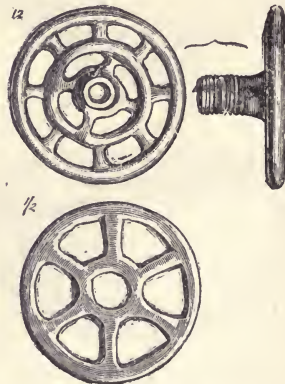


FIG. 135.—Bone Wheels, from Campeggine.

handles, etc., made of bone or horn (Figs. 134-139). Of stone there were numbers of rubbers, corn-grinders, and grooved spheroidal stones (Fig. 140), but very few hatchets and chisels.

Of bronze they found sickles (Fig. 141), spear-heads (Fig. 142), flat celts (Fig. 143), awls (Fig. 144), chisels, pins, etc.



FIG. 136.—Horn Implement ($\frac{1}{2}$). FIG. 137.—Bone ($\frac{1}{4}$).
(Both from Campeggine.)

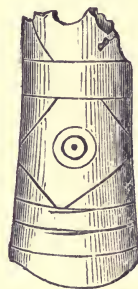


FIG. 138.—Portion of a Bone Handle, from Castione ($\frac{1}{4}$).

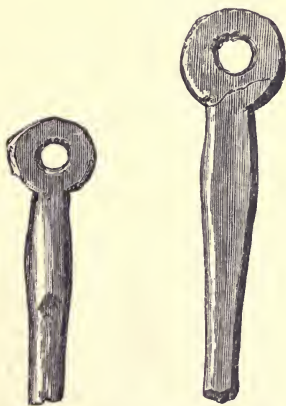


FIG. 139.—Two Bone Objects, from Campeggine ($\frac{1}{4}$).



FIG. 140.—Discoidal Stone, from Campeggine ($\frac{1}{2}$).

Among the objects of uncertain use were classified a series of spindle-whorls of different forms (Fig. 145).

From the existence of metal slag and stone moulds (Fig. 146) the authors inferred that the terramaricoli knew the art of founding in metals.

Professor Strobel gave also a minute description of the bones and other organic remains, to which I shall afterwards refer when treating of his subsequent investigations in this important field of research.



FIG. 141.—Bronze Sickle, from Campeggine ($\frac{1}{2}$).



FIG. 142.—Bronze Spear-head, from Bargone di Salso ($\frac{1}{2}$).

In summing up, the authors used the following words :—

“As to the first origin of the marl-earths, it is clear that the banquets, as you assert, are a considerable part; but there seems to us to appear in the scoriæ, the millstones, the heaps of grain, the palisades, the potsherds, already cited, together with the arms and utensils of all sorts which are found in these earths, something more than a mere meeting-place to banquet. It seems to us, if we do not err, that there is something of settlement and duration. Man did not meet there only to arrange and devour the feast, but to employ himself besides in domestic avocations, in preparing implements and arms, to sew garments and make nets—in a word, to inhabit them; besides to

exercise the practices of their religious worship, and, perhaps, also to burn their dead, and all these after the fashion of barbarians, such as the people of the marl-beds must have been. These people, according to the place and time, were fishermen, hunters, shepherds, and even agriculturists." (B. 30, p. 83.)

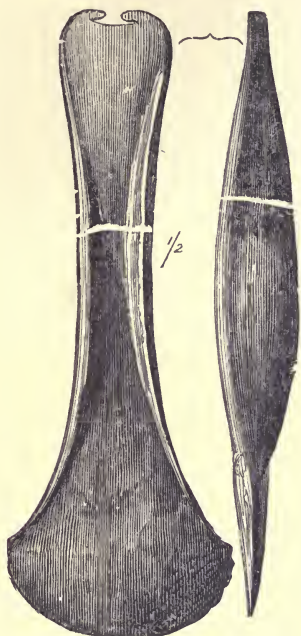


FIG. 143.—Bronze Celt, from Castellazzo.



FIG. 144.—Bronze Awl, with Bone Handle, from Campeggine ($\frac{1}{2}$).

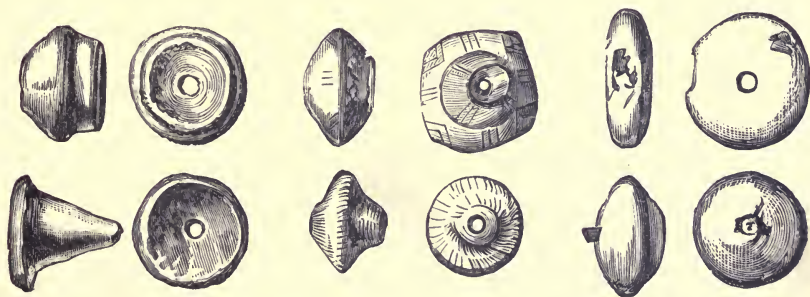


FIG. 145.—Various forms of Spindle-whorls or Beads, from Campeggine ($\frac{1}{3}$).

These words contain the most important feature of this report. The authors, though not absolutely free from the previous notions that floods and inundations had something to do with the stratification of the *débris*, distinctly recognise that the *terremare* must be considered as the remains of the

habitations of the living, and not, as hitherto supposed, the resting-places of the dead.



FIG. 146.—Stone Mould, from Castelnuovo.

New School of Archæology.

Interest in the whole subject now rapidly increased, and extended to agriculturists and local observers. Yearly excavations were carefully scanned, and even special researches were carried on in the interests of science. Strobel, a professed naturalist with remarkably precise and accurate habits, devoted his great energies to the elucidation of the organic remains, especially the rich and varied products of the peaty bed (*terra uliginosa*) at Castione, in which the piles were detected. Pigorini, on the other hand, was an archæologist pure and simple, but endowed with great ability and much fertility in the correlation and generalisation of facts—qualities which have since gained him the chair of archæology at Rome, which he now fills with so much distinction. Thus associated, these two men may be said to have developed a new school of archæology, especially anent the *terremare*, having as its primary and indispensable object the collection of authenticated data, without which, they asserted, no deductions, however brilliant, could be scientific.

In the course of researches conducted by Strobel at Castione, during the years 1862 and 1863, he observed that the piles were placed in a sort of basin, either natural or artificial; that they

supported transverse beams over which clay floorings had been placed; and that they were more thickly set towards the margin, and slanting, as if to strengthen the inner superstructures. Moreover, he proved that the supposed peaty formation (*terra uliginosa*) had nothing in common with true peat, but was simply a subaqueous deposit of ordinary earth, associated with decomposed organic débris. Another terramara in Parma having similar characteristics to that of Castione was investigated in the following year by Pigorini, and thus the theory of an occasional palafitte converted into a land-dwelling seemed to them to be confirmed. Previous to this the stratification of the beds—one of the most remarkable features of these deposits—had not excited any unusual surprise, but now it began to be commented upon.

These and some other noteworthy observations here and there coming to light induced Strobel and Pigorini to issue a second report on the terremare of Parma (B. 28). But in this brochure, which appeared in 1864, there does not appear to be any striking departure from the views expressed by the authors in their previous report. They asserted that the people who constructed and inhabited these dwellings were a nomadic or agricultural race, belonging to the Bronze Age, and were probably allied to the Swiss lake-dwellers; and that their habitations varied in structural character according to the exigencies of the site chosen. No significance was attached to the piles at Castione and elsewhere, beyond supplying a proof that different methods of construction had been in use, the adoption of which depended on local conditions. The composition of the strata as "earthy beds, now ashy, now yellowish, now reddish or black," and their peculiarly wavy arrangement, were supposed to mark merely a variety.

The terremare now became a controversial focus between the adherents of the old and new schools. To the former Cavedoni, Coppi, and subsequently Crespellani, lent their influence; while the latter were reinforced by Boni, Canestrini, Calegari, and Chierici. Amongst all these, during the next few years, Chierici stood pre-eminent. Already an ardent collector of the antiquities of his native country, he found in the mysterious terremare a congenial field, and a new outlet for his love of

practical research. For minute observation and lucid exposition of the phenomena observed in explorations, Chierici had few superiors. To him must undoubtedly be assigned the next great contributions towards the elucidation of the terramara problems. Observing in several instances that an earthy dyke of a quadrangular shape, with a ditch outside, surrounded the terramara mound, and that upright beams, or traces of them, were to be seen in all parts of the deposits, he suggested that these were normal features in their structure. Although some of his contemporary explorers had incidentally noticed piles in a stratum higher up in the débris than that in which they had been found at Castione, and even recorded the fact (B. 133, p. 7), it remained to Chierici alone to interpret the true significance of the discovery. In support of the theory of universality of the palafitte system, he showed that in many cases the piles had entirely disappeared by decomposition, and that the only traces of their existence were the holes they had occupied. Some of these, indeed, had subsequently become filled up by infiltrated matter, so that they presented the appearance of inverted cones. On this point he relates that in one space measuring 210 square metres he counted no less than 124 "buche di pali" (B. 69, p. 9).

It must be remembered that previous to this, archæologists had no clear notion of the order or relative position of the products of different ages and races, and the same confusion extended to the terremare. For instance, at Castelnovo, Chierici seemed puzzled at finding underneath a Bronze Age terramara indications of an older period. At Campeggine, on the other hand, objects of the early Iron Age appeared, but chiefly in the upper strata, while Etruscan remains had been recognised in several instances.

Another point to which Chierici's attention was directed was the frequency with which rectangular enclosures were disposed so as to have their four sides more or less facing the cardinal points; and this orientation within certain limits, varying, it would seem, according to the direction of the sunrise when the settlement was founded, he considered also applicable to all the terremare. On this point, see also Helbig (B. 103).

In his famous theory of the structure of the terramara

villages (B. 69) Chierici conceived the idea that they had been constructed over artificial basins to which a running stream was made to flow so as to convert the *bacino* into a pool of water. This pool was surrounded by an earthen dyke, inside of which a wooden platform was erected on piles and covered with a layer of clay. Huts were then erected over this platform at regular intervals, and the refuse from them was thrown, by means of holes here and there, into the space below. The water entering at one side of the enclosure made its exit at the opposite side. Thus the space below the platform was more or less occupied with water, and the *débris* thrown into it became arranged into sedimentary strata, and so continued to accumulate until the entire space was filled up. When the accumulation of *débris* reached this extent it became necessary to elevate their floorings, and this was done by repeating the same process at a higher level; and in this manner Chierici accounted for the successive platforms and *palafittes* which were to be met with in the *terramara* mounds.

Thus in the hands of Chierici almost every feature of the *terramara* sites excited fresh interest and an eagerness for further inquiries. Piles, or their traces, were found almost immediately in all the stations wherever they were carefully looked for. In 1872 Chierici and Mantovani explored two stations, one at Monte Venere and the other at Monte, near Montecchio, in which were found not only the dyke surrounding the basin and *palafitte*, but, in one of them, three series of piles, one superimposed above the other, thus clearly showing that when the spaces around the piles and underneath the platform had got filled up with *débris*, a second *palafitte* had been resorted to, which in its turn had been succeeded by a third (B. 77 and 83). It was on all hands acknowledged that in many parts the peculiar stratification of the layers in certain beds could only be accounted for on the supposition that water had somehow to do with the sorting of their ingredients, as floating materials, such as bits of charcoal, were often eliminated and formed separate layers. So far Chierici's theory might be taken as offering a complete explanation of the phenomena. But the deposition of the higher portions of the mound remained to be accounted for, as it was difficult to conceive of

pools of water at the requisite heights. A still more formidable objection was the impossibility of transporting water without the intervention of a system of hydraulics to sites placed on elevations far above the level of any adjacent streams, and of this class several had been known, as those at Salso Maggiore (B. 30, p. 22), Mount Venere, Roteglia, Castellaccio, etc. (B. 133, p. 9); yet, in most cases, they also contained the palafitte and dyke. This was the weakest part of the theory and found few supporters, but in other respects every additional discovery only tended to confirm it. Strobel, however, declined to believe in the universality of either dykes or palafittes. Thus, writing in 1874 (B. 93), he says:—

“At the conclusion of an article which I wrote in 1872 on shells of *Unio* found in the Marière, etc., I asserted that the *terremare*, those prehistoric settlements, were terrestrial; that in some of them man lived in pile-dwellings on dry ground, in others he dwelt in tents or huts; and that in some of the *terramara* beds earthworks can be seen which may have been used as dykes or bulwarks, and which in all probability were fortified with ditches.” After showing how impossible it would be for the *terramaricoli* of Roteglia and Castellaccio to have pools of water at such an elevation as they had been, he goes on to say: “And here I may be permitted to raise my voice against those who imagine that prehistoric men, and more especially those of the Marière, and of our *terremare* and pile-dwellings of the Bronze Age, always and everywhere followed constantly one uniform and invariable order in arranging their abodes, as if they were inferior to the animals, nay, even to the invertebrates, who modify their constructions according to circumstances. But, in fact, there is much less uniformity in these *terremare* than is often found in the dwellings of animals; therefore I maintain logically, that even prehistoric men changed their mode of living according to place, time, and circumstances; and that the *terramaricoli* did not live solely in pools of water, as some assert, but had settlements both in the water and on dry land, and that the *terramara* beds are the results of the latter. In some of the terrestrial settlements they probably had pile-dwellings, while in others they lived in huts or tents. Some at least of the land settlements were defended by dykes and ditches.” (B. 44, 2nd ed., p. 402.)

Pigorini, on the other hand, looked favourably on the major portion of Chierici's generalisations, and in the course of explorations conducted by him at Casaroldo in 1874 (B. 92 and 100) he found everything not only in harmony with his views, but some additional facts that seemed to strengthen that portion of his theory, in which he maintained that the palafitte was the normal method adopted in the structure of the terre-

mare, whatever the nature of the locality might be in which they were constructed. Thus at Casaroldo, although there was both a ditch and a dyke surrounding the basin containing the palafitte, it had no peaty under-stratum (*terra uliginosa*), as at Castione, but a substance precisely identical with the superimposed deposits. Here also there were traces of piles on a higher level.

Almost coincident with the publication of Chierici's theory of the terremare, in 1871, was the Bologna meeting of the International Congress of Anthropology and Prehistoric Archaeology, which gave an immense impetus to such studies. Indeed, the decade which followed may be characterised as the Augustan age in the department of prehistoric archaeology in Italy. The remarkable discoveries in the old cemeteries of Bologna, and in Etruscan tombs elsewhere in the Circumpadana district, together with the increasing number of prehistoric stations in lakes, turbaries, caverns, etc., greatly widened the field of research and added to the difficulty of deciphering, from amidst the endless overlappings of their remains, the history of the various civilisations which formerly flourished in the country. In order to facilitate these studies the *Bullettino di Paletnologia Italiana* was established at the commencement of 1875, under the joint editorship of Chierici, Pigorini, and Strobel. This periodical has done much good and is still in a flourishing condition under the direction of Pigorini, with the collaboration of Castelfranco, Colini, Ghirardini, Issel, Orsi, Patroni, and Pettazzoni.

Special Investigations at Castione.

Such was the general tenor of the opinions held in regard to the terremare up to 1877, when, owing to the interest then taken in these singular remains and with the view of clearing up some of the contested points, the Minister of Public Instruction ordered a fresh excavation to be made at Castione, under the superintendence of Professor Pigorini. The portion selected was an oblong space at the north side of the church, beginning at the margin and stretching inwards for a considerable distance. The result of this was the disclosure of a new and remarkable feature in its structural arrangement. At

the inside of the earthen dyke, and intervening between it and a forest of piles which extended towards the interior, was a series of small rectangular enclosures constructed of horizontal beams laid one above the other. These enclosures, which extended side by side like a string of log-houses, formed an abrupt facing to the dyke. The beams were roughly hewn, and partially mortised into each other at the points of crossing, from which their ends projected irregularly, some even extending from one compartment to the next. Inside these log-houses there was nothing but rubbish—clay, gravel, bits of wood, etc.—packed firmly together. But it is needless to enter upon all the details of this curious structure; suffice it to say that Pigorini came to the conclusion that their purpose was to support the inside of the earthen dyke (*contrafforte dell' argine*). When the space in front was cleared there was quite a forest of piles, and it is noteworthy that they were all inclined in one direction, viz., north-east, a fact which is well shown in the first of the two photographic illustrations here given (Pl. XXXIII.).

It will be seen that although most of the piles are arranged in parallel rows, yet there are others which deviate from this plan. This irregularity is accounted for by Pigorini by the fact that the photographic view shows two series of piles, one corresponding to the first habitable area and its platform, and the other to a later superstructure. On examination the two series of piles could be distinguished from each other by their respective depths in the débris—the former penetrating deeply into the virgin soil, whereas the tips of the latter scarcely reached it. Pigorini is therefore of opinion that the terramaricoli were in the habit of planting the piles in regular rows, as had been already noted at Bellanda, Cogozzo, Montale, etc. In the terramara of Parma they were found to be in straight rows, 0.60 metre apart, while the piles in each row were separated by 0.30 metre.¹

¹ I have here reproduced a photograph (Pl. XXXIV., A) which was taken for the Congress of Italian Scientists held at Parma in the autumn of 1907 (*B.P.*, xxxiv., tav. 1). It represents a view of piles uncovered by excavations, made in the town of Parma for the special benefit of the members of the Congress. As the photo could only be taken from a point looking down on the excavation, and as the piles, like those at Castione, were much inclined, the impression produced by the picture is that the piles are in a horizontal position.



Two views of the Piles and Woodwork exposed at Castione during the Special Excavations conducted by Prof. Pigorini in 1877.

From an examination of the composition of the soil outside the limits of the station, Pigorini ascertained that the bluish clay-bed forming the subsoil of the terramara mound corresponded to what was the surface of the surrounding plain when the terramaricoli founded their settlement, and that the thick mass of alluvial yellowish clay in which the mound is now partially buried had been subsequently deposited.

Other interesting details are given in Pigorini's exhaustive report regarding the structure of the ditch, dyke, platforms, hearths, etc., and the peculiarity and composition of the strata, all of which are critically compared with the result obtained on other terremare. But in view of later discoveries many of the points discussed have now only an academic value, and I must be content with quoting the following summary of his conclusions in regard to the origin of the station:—

“The terramaricoli having arrived at the place now called Castione dei Marchesi did not select for their encampment a low-lying spot subject to inundations, but the top of a slight elevation of bluish clay not yet covered with the more recent alluvial deposits. The space measured out for the station was of a rectangular shape and covered about a couple of acres. This area they surrounded with a ditch, the excavated soil being thrown to the inside and so they formed a dyke 6 feet in height, which consequently enclosed a *bacino* having its base on the original soil of the plain. The area thus defined had an orientated position with a deviation of 30 degrees from east to north.

“Having completed the surrounding ditch and dyke, the next step was to construct along the inner margin of the dyke a series of log-houses, bound together and filled with *débris*, over which they finally laid a gravel pavement. The main object of this elaborate structure was to support the earthen dyke. Next they planted all over the *bacino* rows of piles at regular intervals, whose tops reached to the level of the surface of the *contrafforte*, and over them they laid horizontal planks of wood, which in certain places were covered with beds of clay (*tavole coperte d'argilla*).

“On this platform were constructed the huts of the people. The exact form of these huts has not been ascertained, but they were certainly made of wood, straw, and clay, no other material having been used either at Castione or any other terramara. The village was now complete, and the inhabitants, in the course of their domestic avocations, threw the refuse of food and other *débris* into the space below, probably by means of holes, which gradually accumulated until the space became completely filled up.

“When this stage was reached the people did not change their chosen site, but proceeded to erect a new palafitte above the old one. They elevated the

dyke by extending its base, placed new *contrafforte* along its inner side superimposed on the older ones, and thus converted the surface of the first platform into the base of the new one. They then repeated the operation of planting it with piles, and over these a new platform and huts were erected, which were occupied as before until the accumulation of débris again drove the inhabitants to construct a third habitable area at a still higher level" (B. 133, p. 44). Illustrations of some of the industrial remains found at Castione and other terramara sites in the neighbourhood of Parma are given on Plate XXXV. (For details, see List of Illustrations.)

Castellazzo di Fontanellato.

Such were the general opinions held by Italian archæologists regarding the terremare up to 1889, when I made my last trip to the Continent in pursuit of materials for *The Lake-dwellings of Europe*. I appreciated the instructive discussions aroused by these somewhat obscure habitations, and visited the sites of a few of the more accessible. I had, however, no hesitation in classifying them as a development of the ordinary palafittes of the Po Valley; and hence the terremare form an integral portion of the section of that work devoted to the lake-dwellings of Italy. Since then further discoveries have been made which not only sustain, but even intensify the interest and curiosity which they had already excited in the minds of European archæologists. But it took over a dozen years of active field-operations before Professor Pigorini was able to fill in the final details of the picture of the terremare which he had sketched after his investigations at Castione (B. 133).

It was in 1888 that Pigorini commenced the systematic excavations of the terramara of Castellazzo di Fontanellato, in the province of Parma—a task which he continued *con amore* at intervals during his holiday vacations, till 1896. The results of his labours were numerous and varied, but it is unnecessary now to describe in detail the piecemeal discoveries which finally culminated in giving to the archæological world a complete exposition of one of the most ingenious systems of habitation hitherto adopted by any of the prehistoric peoples of Europe. In order to understand the significance of the operations it will only be necessary to give a brief description of his results, as embodied in the accompanying plan (Pl.

XXXVI.), published in 1897 (*B.P.*, xxiii., tav. iv.), which, by his permission, I am enabled to lay before you. The station was situated on the plain and had the form of a slightly orientated trapezoid, covering an area of 187,891 square metres. It had parallel sides, running roughly north and south, but of unequal length, the western measuring 645 and the eastern 540 metres; while the north and south sides measured only 330 and 375 metres respectively. These dimensions include the rampart and moat (*Notizie degli Scavi*, December 1892).

Description of the Plan.

A moat (B), 30 metres wide and $3\frac{1}{2}$ metres deep below the level of the original plain, surrounded the habitable area, and was kept supplied with water from a neighbouring stream by means of an artificial canal (A). The acute angle of the trapezoid was directly facing the centre of this canal, and divided the current so as to make it flow partly to the west and partly to the south. An overflow canal (C) was situated about the middle of the east side, and being only 0.60 metre deep, so that water always remained in the moat to a depth of nearly 3 metres. Along the inside of the moat there was a rampart (D), 15 metres broad at the base, having its outer side sloping and its inner vertical, being kept in this position by a *contrafforte* (E) 2.50 metres in breadth. This *contrafforte* was constructed of timbers arranged in a series of small compartments, like log-houses, which were filled with rubbish—gravel, clay, potsherds, etc. Although the woodwork had almost entirely decayed, there was no difficulty in recognising that, in structure, it was precisely similar to that at Castione already described, (see Pl. XXXIII.). The only access to the settlement was by a wooden bridge (F), near the middle of the south side, which, judging from its remains found in the moat, measured 60 metres long by 30 metres wide at its base. At this point the moat had been widened for a distance of 60 metres to double its breadth elsewhere.

At a short distance from the inside of the east rampart there was a raised mound of natural earth (G), 100 metres long and 50 metres broad, having its east and west sides running parallel to the corresponding sides of the terramara.

It was surrounded by a *contrafforte* and a moat (H), 30 metres wide and a maximum depth of 6 metres below the level of the original surrounding plain. The moat had been crossed by three wooden bridges (*c*, *d*, and *I*), midway along its north,

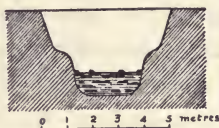


FIG. 147.—Transverse section of Ritual Trench in Castellazzo.

west, and south sides. The foundations of these bridges measured 30 metres in length by 15 metres in breadth—just half the dimensions of the great bridge which spanned the outer moat. This mound (*area limitata*) was evidently the citadel (*arce* or *templum*) of the village.

Within its area there was a trench (X) 25 metres long, 5 metres wide, and 3.50 metres deep, running across its middle in line with the bridge (I). The bottom of this trench, which was only half the width of its top (Fig. 147), was on a level with the virgin soil, and in it were executed, to a depth of 1.50

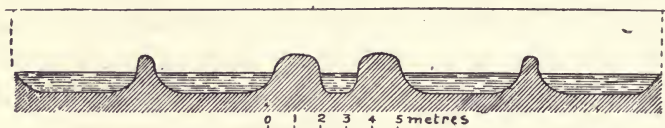


FIG. 148.—Longitudinal section of Ritual Trench in Castellazzo.

metres, five rectangular pits (*pozzetti*), as shown on Fig. 148. The central one was square, each side measuring 1.50 metres, but the other four, two on each side, were of equal size, viz., 5 metres in length by 2.50 metres in breadth. These pits were separated from each other by a septum of undisturbed earth, varying in breadth from a $\frac{1}{2}$ metre to 1 metre, and each pit had been covered by a wooden lid supported on crossbars. These novel receptacles were filled with a muddy deposit, containing some shells of *Unio pictorum*, terramara potsherds, animal bones, and a few flint flakes. They are regarded by Pigorini as the prototypes of analogous pits found in Roman camps, such as those described by M. Jacobi of Homburg as occurring in the German Limes, which are generally supposed to have served a ritual purpose.

It is worthy of notice that the direction of the bridge (F) was not at right angles with the sides of the moat; but in line with the main street, which extended midway between the two



A.—View of Piles *in situ* in the Terramara of Parma.



B.—View of Piles in one of the Streets of Castellazzo.

Pile-structures in Terremare. (After Pigorini.)



Castione and various other Terremare in the vicinity of Parma.
(Nos. 1-12, 18-20 = $\frac{1}{2}$, and the rest = $\frac{1}{4}$ real size.)

parallel sides of the settlement. This street was 15 metres wide, and it is conjectured that, although the foundations of the bridge were 30 metres broad, the gangway which they supported was only 15 metres wide, so as to correspond with the width of the street. Starting from a point in the main street just opposite the middle of the citadel and in line with the bridge I, another street, but only half the breadth of the former, viz., 7.50 metres, ran to the western margin of the settlement. Pigorini has pointed out that these two intersecting streets are virtually the same as in a Roman camp, with its *Cardo maximus* and *Decumanus maximus*, the former being double the width of the latter. Two other streets (*b* and *f*), parallel to the *Cardo* but only half its breadth, extended the whole length of the settlement; while four streets (*g*, *h*, *i*, and *l*), running parallel to the *Decumanus*, and also measuring half its breadth, i.e. 3.25 metres, intersected the former at regular intervals. Thus the whole habitable area of the settlement was divided into so many rectangular divisions (*m*, *m*) of equal size, each measuring 75 metres by 50 metres, with the exception of the end spaces (*p*, *p*), which necessarily varied in consequence of the trapezoidal shape of the site. All the spaces formed by the intersections of the streets contained traces of the piles which had supported the wooden platforms on which the village huts had been erected.

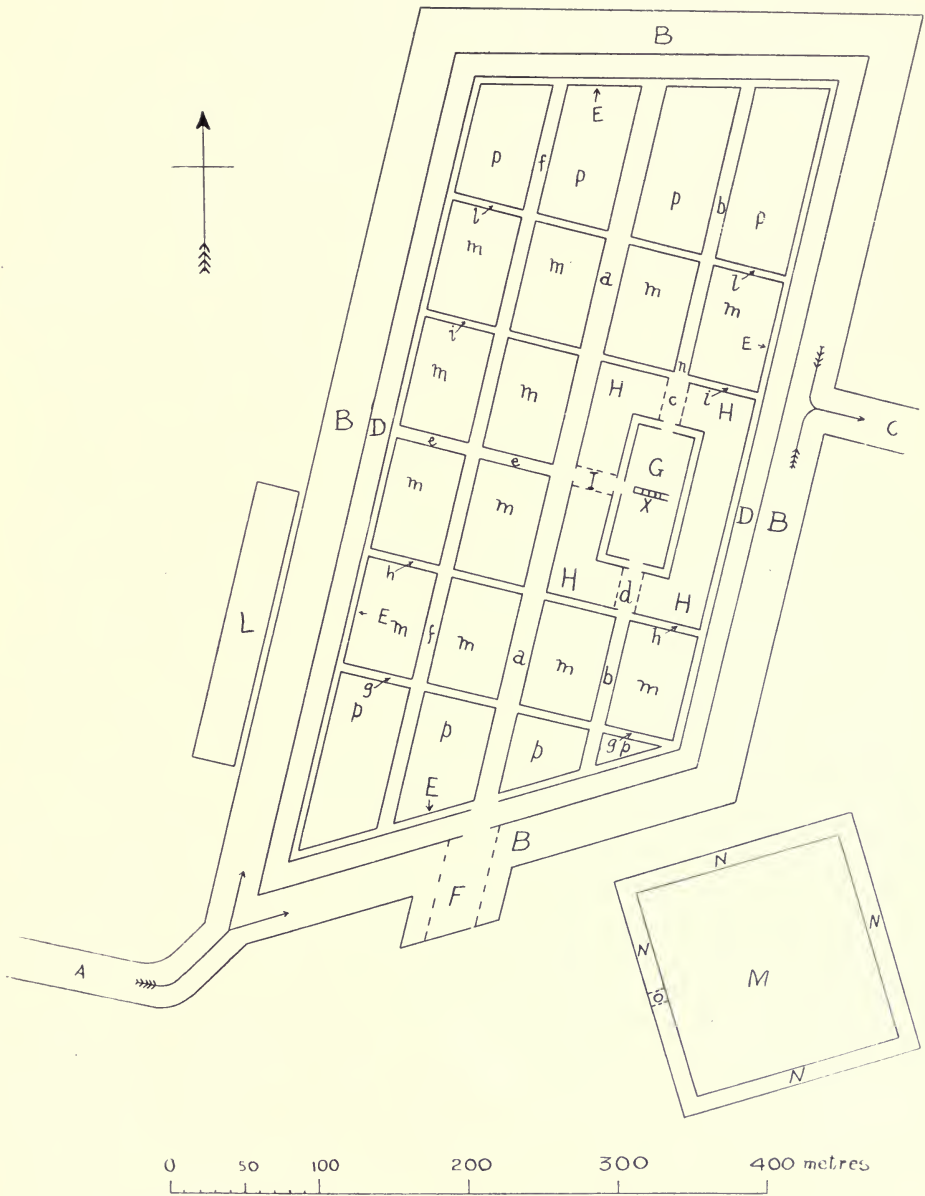
From a glance at the plan it will be seen that the number of streets in this terramara was eight; but the number in other stations varied according to their size. Thus in the terremare of Bellanda and Rovere di Caorso there were only one *Cardo* and one *Decumanus*, which divided the settlements into four habitable quarters.

Clay similar to the alluvial deposits of the surrounding plain was used in the formation of the streets, but no ordinary terramara relics were found in its substance. Pigorini had, however, long conjectured, from his occasional finding of pieces of decayed wood in these barren pathways, that they had been originally strengthened by some kind of wooden erections. All doubt on the matter was removed by the discovery, in 1895, of three rows of piles at the point *n*, in one of the side streets where the consistency of the clay was favourable to the preserva-

tion of wood (*B.P.*, xxiii., p. 63). The photographic illustration (Pl. XXXIV., B) shows the disposition of these piles. The supposition is that the clay and earth which formed the substance of these streets was kept in position by transverse beams resting on piles at a height above the virgin soil of 2 metres, so as to be on a level with the habitable platform. It will be observed that the rows of piles were not equidistant, the middle one being 2.10 metres and 1.10 metres respectively, apart from that right and left of it. The piles in each row were placed at a uniform distance of 0.60 metre from each other.

Among the more important results of the investigation at Castellazzo was the discovery of two cremation cemeteries containing vases with calcined bones. One of the cemeteries (L), 180 metres long and 30 metres broad, was situated just outside the western moat (Pl. XXXVI.), but its contents had not been explored. The other (M) was near the south-east corner of the village, and had a square shape, each side measuring 165 metres. On examination it turned out to be a veritable pile-structure with rows of cinerary urns placed close together, not on the ground, but on a wooden platform. This necropolis was surrounded by a moat (N), 10 metres broad and 1.60 metres deep, and over it there had been a bridge (O), 10 metres wide. It would thus appear that the houses of the dead were constructed on the same plan as those of the living.

The terramara of Castellazzo was by no means a newly discovered site when Pigorini began his investigations, as its fertilising earths were excavated by the peasants from time immemorial. The relics found from time to time had not been carefully collected, but, nevertheless, a considerable number had been sent to the museums of Parma and Rome. The more important of these Pigorini published in a Plate attached to the first report of his special researches at Castellazzo (B. 157). I have here reproduced it on a smaller scale (Pl. XXXVII.); Nos. 1 to 4, 7, 8, and 19 are specimens of ordinary terramara pottery; 7 and 8 are supposed to be loom weights; the terracotta figurine No. 5 is probably intended for a wild pig; Nos. 6, 13, and 16 are objects made of deer-horn; No. 15 is evidently a bronze pendant. The rest are well-known implements or weapons of the Bronze Age.



TERRAMARA CASTELLAZZO DI FONTANELATO
nella provincia di Parma
 RPI 1897

Plan of the Settlement. (After Pigorini.)

Rovere di Caorso.

It now remains to be seen if the unique structural features just described are to be found in other terremare. The discovery of objects or appliances made of so perishable a material as wood among the débris of a habitable site, dating as far back as the Bronze Age, is such a rare occurrence that the instance of finding one well-preserved specimen may be the means of throwing so much light on points hitherto unexplained, that the investigator may feel justified in drawing deductions which would not be warranted from the meagre traces actually observed. From a few handfuls of brown dust it would be hazardous to infer the former existence of a novel framework of wood. Although the *contrafforte dell' argine* at Castellazzo was much decayed, there could be no doubt that it had the same structural character and served the same purpose as that at

Castione. But the *raison d'être* of the trapezoidal form, the structure and distribution of the streets, the *area limitata* with its ritual pits, etc., were novel features, which, though disclosing a carefully-thought-out plan of habitation, required further investigations before they could be claimed as evidence of a typical terramara system of village life.

To clear up this matter was the primary object of the exploration of the terramara of Rovere di Caorso, situated some 14 miles to the east of Piacenza. Excavations were begun in 1893, and continued for a few years, with the result, as may be seen by consulting the accompanying plan (Fig. 149), that it exhibited the essential features of the novel structures disclosed at Castellazzo, except as regards the dimensions of the site,

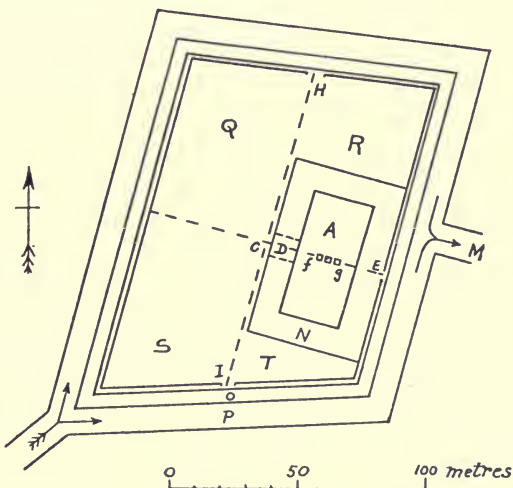


FIG. 149.—Plan of Rovere di Caorso.

which were very much smaller. The four sides of this settlement measured respectively 170, 150, 135, and 130 metres. It had a surrounding moat (P), a rampart (O), a *contrafforte* (B, I, E, H), a canal for the inflow of water to the moat (L), and another for its exit (M). There was also a citadel (A), with a surrounding ditch, over which there had been a bridge

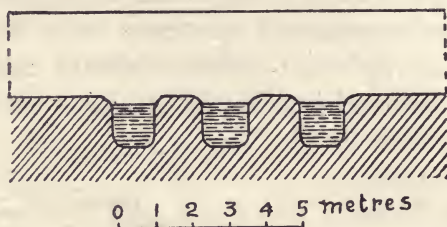


FIG. 150.—Longitudinal section of Ritual Pits at Rovere di Caorso.

(D), and three ritual pits (*f-g*), as shown on Fig. 150, which represents a section along the line of their direction. Though thus differing in point of numbers from the ritual pits of Castellazzo, they contained the same muddy deposit, with shells of *Unio pictorum*, fragments of terramara pottery, pebbles, and flint flakes. There were, however, only two streets, the *Cardo* (H, I) and *Decumanus* (D, E), which divided the habitable area into four quarters (Q, R, S, T). (*Not. degli Scavi*, 1894.)

Montata dell' Orto.

The terramara of Montata dell' Orto, in the province of Piacenza, though situated on a hill, was proved to retain all the characteristic features of the stations on the plains. It was finally explored, in 1898, by Cav. Luigi Scotti (*B.P.*, xxvi., 151; *Not. degli Scavi*, 1900, 118). The result of his researches was to show that the structural details observed at Castellazzo could not be regarded as exceptional features, as some of them were here repeated with a greater degree of parallelism than at Rovere. Like the latter this station covered a comparatively small area, its sides measuring only 125, 135, 100, and 95 metres (see Plan, Fig. 151). The plateau containing the remains of this settlement rises some 30 metres above the level of the bed of the Stirone, a neighbouring stream to which the surplus water from the moat found its way. The moat, 15



Relics from Castellazzo.

Nos. 1, 14, 15 = $\frac{2}{3}$; 5, 13, 16 = $\frac{1}{3}$; 7, 8 = $\frac{2}{3}$; the rest = $\frac{1}{3}$ natural size. (After Pigorini.)

metres wide and 4 metres deep, was cut at the foot of the declivity, a distance of 30 metres from the rampart. The latter was situated along the edge of the plateau, and measured 5 metres in breadth and 1.20 metres in height. Its outside sloped gently towards the moat, while its inner side presented a vertical face, evidently caused by the former existence of a

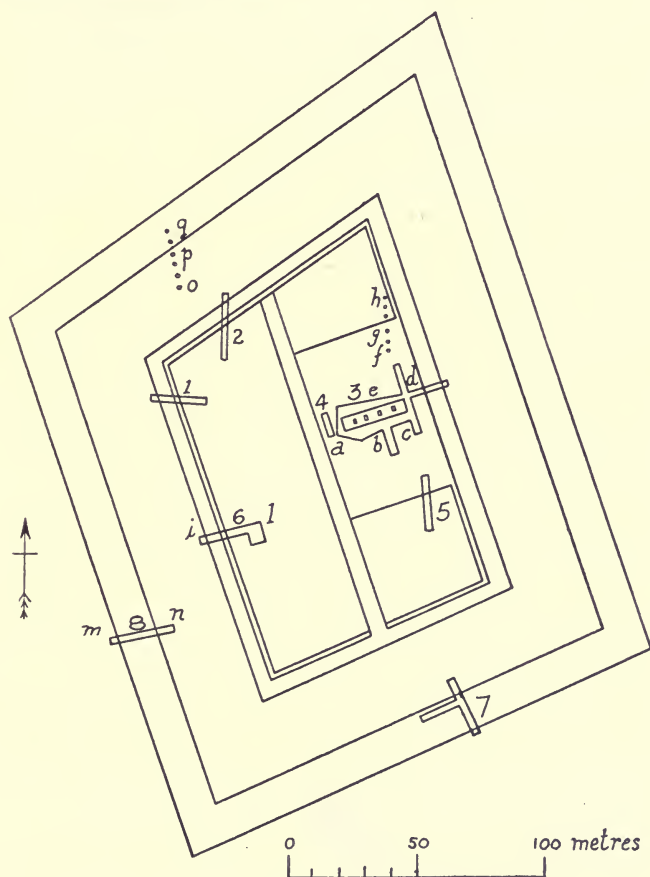


FIG. 151.—Plan of Montata dell'Orto. (After Scotti.)

contrafforte, which, however, was no longer extant, owing to decay. At the base of the rampart, directly underneath the *contrafforte*, there was a small trench excavated in the virgin soil 0.45 metre wide and 0.40 metre deep, and filled with earth, pebbles, terramara potsherds, and other débris. As the cutting of this trench must have been contemporary with the founding

of the settlement, it was regarded as an augural trench (*solco augurale*) constructed for the purpose of defining the original limits of the site (see Fig. 152).

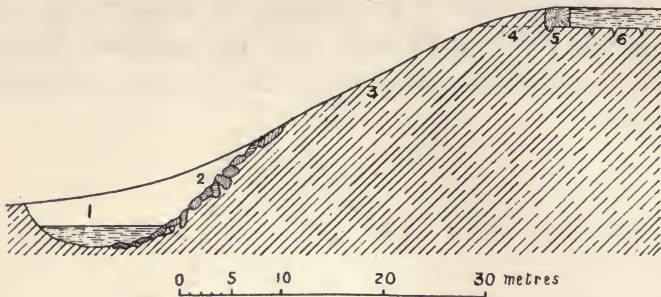


FIG. 152.—Section through Moat and Rampart of Montata dell' Orto.

The *area limitata* was not surrounded by the usual ditch, but its dimensions were sufficiently large to bring its west side on a line with the main street (Cardo), an arrangement which, to some extent, made the ditch less necessary. It contained,

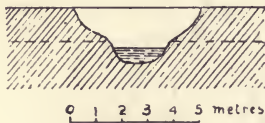


FIG. 153.—Transverse section.

however, five ritual pits all of uniform size, viz., 5 metres long, 2.50 metres broad, and 0.70 metre deep—thus differing from those at Castellazzo in having the middle one the same size as the other four. Like the ritual pits at Castellazzo and Rovere, they contained a muddy deposit mixed with potsherds, broken bones (some calcined), flint chips, and pebbles—materials in all respects similar to the contents



FIG. 154.—Longitudinal section.

of the augural trench. From the presence of some decayed wood it was inferred that each pit had been covered with a wooden lid—a feature which had already been observed at Castellazzo (see Figs. 153 and 154).

The space inside the rampart was occupied with the piles which supported the huts. They were arranged in parallel rows at intervals of 2.50 metres, running north and south, the

piles in each row being 0.60 metre apart. There was also evidence to prove that a street (Cardo) extended along the whole length of the habitable area. These details will be readily understood by a study of the accompanying plan and sections. The Nos. 1 to 9, Fig. 151, indicate the different excavations made by Scotti.

The relics collected in the course of the excavations at Montata dell' Orto are now in the Museo Civico of Piacenza (*B.P.*, xxvi., p. 163). They consist of a variety of objects precisely similar to those found on the ordinary terramara sites of Emilia, among which the following may be noted :—Fragments of pottery showing vessels of various sizes, *anse lunate*, spindle whorls, etc. ; a number of articles made of bronze include a sickle, knives, pins, and fragments of a couple of axes ; among stone objects are an axe of green diorite which had been used as a hammer, and a few flint flakes and cores ; implements made of deer-horn are also in considerable quantity.

The entire absence of Roman relics, even in the ritual trench, proves that the theory advocated by Professor Sergi, viz. that the terremare were Roman camps, is untenable. Its position on a hill, while still retaining a moat at its base, *i.e.* in circumstances where it could not serve as a protection against flooding—a theory maintained by Brizio—shows that the moat was looked upon as an essential feature in the terramara system of habitation. It had been long ago pointed out (B. 133) that the terremare of Monte Venere, Roteglia, Castellazzo, and others, were situated on elevations far above the level of any adjacent streams, but yet they contained both a palafitte and a rampart. One at Castelnovo Fogliani had all the characteristic features of the terremare of the plains—trapezoidal shape, orientation, moat, rampart, *contrafforte*, and a palafitte. On the other hand, that at Castellarono had only so far revealed remains of piles. (*B.P.*, xxix., p. 203, note.)

It must not be forgotten that, in drawing general deductions, few of these settlements are so complete as to reveal all the features they once possessed. Many of them have disappeared altogether by the hands of the agriculturist ; others are so occupied by modern buildings that they can only be partially explored ; while others, again, are so deeply buried under the

accumulation of alluvial deposits that on the score of expense their exploration is beyond archæological resources.

Characteristics of a Typical Terramara.

We have now reached the goal of the researches which have finally determined the structure of a typical terramara, the result of which may be thus briefly summarised:—The fully developed settlement was virtually a land palafitte, trapezoidal in shape, and having its parallel sides running roughly north and south. According to Chierici the degree of orientation depended on the direction of the sunrise when the settlement was founded. The habitable portion of the village was protected by a moat and a rampart constructed of the earth thrown out of the former, with a *contrafforte* on its inner side so as to present a firm vertical face to the internal palafitte. The structure of this ingenious arrangement was first described by Pigorini during his memorable investigations at Castione (B. 133). Since then, however, decayed remains of analogous structures have been found in nearly all the terremare investigated.

The citadel (*arce* or *templum*) was always midway along the eastern boundary, occupying a rectangular space between the *Cardo* and the rampart. It was composed of a mass of raised earth, and generally surrounded by a ditch and a *contrafforte*. But the most novel of the later discoveries was the mysterious ritual pits, which suggest an intermediate link between the religious rites of the terramaricoli and those of the Romans.

Pigorini's explanation of the object of having the more acute angle of the trapezoid facing the centre of the canal which supplied the moat with water reveals a surprising amount of ingenuity, and its recurrence in other settlements besides that of Castellazzo proves it to be a common feature of the typical terramara. It has also been observed that this angle in stations south of the Po was generally directed towards the south (that of Montata dell' Orto being, for geographical reasons, an exception to the rule), while the reverse was the case in those on its north side. This peculiarity finds a ready explanation in the fact that the tributaries of the Po on its north side flow in the opposite direction from those on its south side.

CHAPTER XIII

CULTURE AND CIVILISATION OF THE TERRAMARICOLI

Introductory. Montale. Gorzano. Casale Zaffanella and other Stations north of the Po. Castellaccio. Lacustrine Station at Offida. Terramara at Taranto. General remarks on the Terramara Settlements.

IN the previous chapter I described some special investigations which, in the hands of Chierici, Strobel, Pigorini, and other eminent archæologists, culminated in the discovery that a typical terramara settlement was a land habitation comprising a group of huts supported on piles, and fortified by an earthen rampart and moat. We shall now proceed to inquire into the social condition, culture, and civilisation of the people who inhabited these villages, by an inspection of such of their relics and food-refuse as have been found from time to time among the accumulated débris of a more or less lengthened occupation. I make no pretence, however, of supplying an exhaustive report of all the discoveries known to have been made on terramara sites during the long period they have been under critical review. Their archæological records are scattered throughout so many obscure and almost inaccessible tomes, local monographs, archæological periodicals, and even daily and weekly journals, that the task would be a veritable *tour de force* which no Italian antiquary, to my knowledge, has yet undertaken. I have, therefore, selected for the present purpose a few of the more carefully explored sites, especially those which have yielded an abundant assortment of relics of everyday life. The knowledge thus acquired has been culled from all sources to which I have had access—books, periodicals, museums, etc., as will be seen from the copious bibliography and number of illustrations I am able to lay before you.

Montale.

One of the most instructive stations, from the above standpoint, is that of Montale, situated a few miles south of Modena, which I had the pleasure of visiting in company with the distinguished archæologist, Sig. Crespellani. In this terramara the elevation of the mound is more marked than at Castione, as the entire mass stands clear above the surrounding plain, and, like it, the central part is occupied by a church and some other religious buildings. Its discovery was not made till 1868, but, its contents being readily accessible, the progress of its demolition has been rapid. The annual explorations conducted in this mound, of course regulated by agricultural demands, are now entirely in the hands of the authorities of the Museo Civico at Modena, who appropriate all rare objects for the enhancement of their large and valuable prehistoric collection. The director of the museum, Sig. Boni, publishes from time to time a report of the excavations and of the results obtained.

According to Boni, the area of the mound, including the dyke, was 9000 square metres (about 2 acres), of which about 4000 are occupied by the ecclesiastical buildings already referred to. Of the remaining space available for explorations about one-half was cleared away up to 1890. On the north side of the church, just on the verge of the pit where the workmen were riddling and preparing the saleable stuff, stood an enormous chestnut-tree, whose roots could be seen below the grassy surface projecting from the perpendicular face of the section. The priest, whose house forms part of the ecclesiastical buildings on the mound, soon joined our party, and expatiated on the fabulous age of this tree, but which Crespellani reduced to something like 150 or 200 years. The entire height of the section here exposed would be from 15 to 20 feet, the upper five of which consisted of mouldy soil, which has, of course, to be removed before the commercially valuable stuff is reached. In the course of the removal of this upper stratum the following objects were found, viz., an iron hatchet, fragments of a spur, several keys, and some much corroded coins of the Old Empire. The remains of fifteen

human burials were also encountered, three of which had the bodies enclosed in cists made of large bricks. Indeed, some large tiles, apparently part of a sepulchre, were still to be seen protruding from a part of this layer. Near one of the unenclosed burials lay a terracotta lamp and a bone comb with a double row of teeth. Sunk into the upper part of the terramara beds was a primitive lime-kiln, "evidently," says Boni, "introduced into the *cumulo marnoso* at a later period than its formation" (B. 130, p. 13).

The great depth of this upper bed of mould, which exists in all the terremare, is very remarkable, and most puzzling to archæologists. Boni thinks it was spread over the mound at some posterior time, either for agricultural purposes, or as hygienic precautions, or perhaps from motives of respect to the supposed sacred character of its contents.

All the rest of the section was terramara proper, whose contorted and wave-like beds could readily be distinguished. Sticking in the face of the section were innumerable fragments of black pottery, broken bones, and bits of charcoal. All the stuff, before being disposed of, was passed through riddles, and what remained was thrown aside as useless rubbish, the heaps of which could only be estimated by cartloads. The riddlings consisted almost entirely of broken pottery, among which were occasionally clay weights and more frequently spindle-whorls, together with the bones and horns of animals, many of which were converted into implements. Bronze objects were comparatively rare.

Part of a large earthen dyke which is supposed to have surrounded the entire mound was still left exposed on the north side. It measured from 20 to 30 feet in breadth at the base and $11\frac{1}{2}$ feet in height. Boni, in his description of this dyke, states that a section which ought to be conical is not so, but more slanting on the outside; also, at the inner side, its contents are occasionally seen to overlap the terramara beds. From this and some other structural details he adduces evidence to show that the dyke had been subsequently added to by the terramaricoli during their occupation of the settlement. Bearing in mind what Pigorini had said about the

contrafforte dell' argine at Castione, the significance of these observations will be readily perceived.

In 1871 the station of Montale was selected as the most suitable to be visited by the members of the International Congress of Anthropology and Prehistoric Archæology, who in that year met at Bologna; and for their special benefit new sections were opened up. A short account of this excursion is published in the proceedings of the *C.A.P.* for 1871 (p. 171), the writer of which incidentally remarks that twelve or thirteen *terremare*, in the vicinity of Modena, were then being exploited for their fertilising materials. Some were nearly exhausted and others were difficult of access. In selecting that of Montale the committee were guided by its typical character, the integrity of its deposits, and its proximity to the city. The true *terramara* layers were exposed at a depth of about 1 metre beneath the surface, and showed a stratified appearance, the strata being sometimes horizontal and sometimes inclined or wavy. The contents of the trenches yielded to the distinguished visitors a rich harvest of characteristic remains, consisting of fragments of pottery, a few bronze objects, bones of animals, charcoal and ashes, and, finally, the stumps of piles embedded in the virgin soil underneath the artificial mound.

For illustrations of the various relics found at Montale, see Pl. XXXVIII. and Pl. XXXIX. (Nos. 1 to 6); and for its literature, B. 54, 62, 63, 67, 75, 101 (*b*), 124, 130, 137, and 140 (*a* 2) may be consulted.

Gorzano.

The old-school views advocated by Dr Coppi, viz., that the *terremare* were remains of funeral pyres (*roghe*), so much biassed his mind that for many years he appeared to have paid little attention to the significance of the position of the relics in the stratified deposits, and consequently the first two volumes of his magnificently illustrated monograph on the *terramara* of Gorzano (B. 70 and 88) lose much of their value from having objects of different ages indiscriminately mixed. This defect is so far removed in the third volume (B. 96) that he divides the deposits into upper and lower, corresponding to the historic and prehistoric periods. But,

notwithstanding Dr Coppi's antiquated notions and methods, his books and investigations are of considerable scientific value, as his numerous matter-of-fact observations are strictly to be depended on and his illustrations are excellent.

The accompanying plan and section of the site of Gorzano (Fig. 155) will convey a general idea of the position of the terramara deposits with respect to their immediate

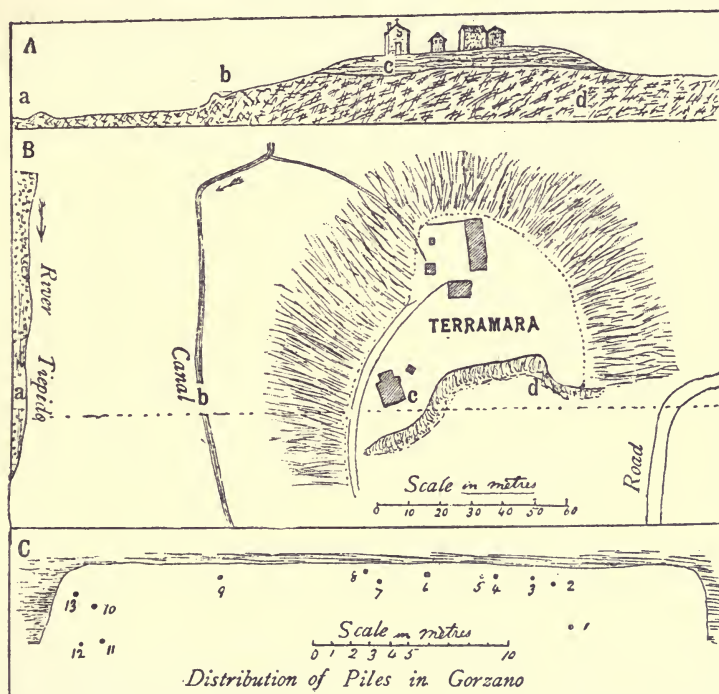


FIG. 155.—Plan and Section of the Terramara of Gorzano. (After Coppi.)

A, section showing ecclesiastical buildings over the terramara deposits (c); B, plan of the site; C, a selected portion showing distribution of piles.

surroundings. They extended in length about 90 to 100 metres from north to south, and 70 metres in breadth, with an average thickness of 3.50 metres. The settlement was constructed on a natural elevation, rising about 9 metres above the surrounding plain, and 11 metres above the bed of the adjacent stream Tiepido. It was surrounded by a ditch and a dyke, and also contained the remains of a palafitte. The existence of piles is clearly proved by Dr Coppi himself, who shows their distribution on the plan,

C; but at the same time he denies that they are the remains of a pile-structure.

A good idea of the comparative frequency of industrial remains found on terramara sites will be got from a study of Dr Coppi's report of the excavations at Gorzano during the year 1875 (B. 96, p. 21). In this year there were 274 cubic metres excavated, covering an area of 180 square metres; and from this mass of débris there were collected 3051 objects, of which 173 belonged to the upper or Romano-mediæval stratum, which varied from 1 to 1½ metres in thickness. The rest of the objects, which came from the under strata, and were reckoned prehistoric, are thus classified:—852 industrial objects, 1544 remains of vertebrate animals, 285 remains of molluscs, 153 vegetable remains.

The 852 industrial remains are again thus assigned:—

Bronze.—50 objects, viz., 8 pins, 4 axes, 12 daggers, 1 chisel, 2 awls, 6 discs, 1 spindle-whorl, 2 fragments of sickles, and 14 diverse pieces.

Bone.—80 objects, viz., 38 needles and pins (of which 23 are entire), 9 spatulæ, 17 pointers, 3 chisels, 6 teeth, 1 lamina, 5 awls, and 1 handle.

Horn.—62 objects, viz., 7 small wheels, 1 cylinder, 1 comb, 2 arrow-points, 17 spatulæ, 12 pointers, 2 awls, 3 ornaments, 2 picks, 4 handles, and 17 diverse objects.

Stone.—68 objects, viz., 2 flint knives, 2 pendants, 4 spindle-whorls, 2 discs, 4 weights, 6 grinding-stones, 1 polisher, 3 flint nodules, 4 flakes, and 30 worked stones.

Terracotta.—585 objects, viz., 494 spindle-whorls (Pl. XXXIX., No. 17), 2 cylinders, 12 weights, 68 vases, 3 covers, 5 percolators, and 1 small animal figure.

The bones capable of being determined represented 15 oxen, 25 sheep or goats, 7 stags, 8 roe-deer, 30 pigs, 2 wild boars, 14 dogs or wolves, 1 cat, 8 birds, 1 tortoise, and 15 toads.

The industrial remains from the upper stratum were as follows:—The central part of a Byzantine crucifix, 1 lamp, 2 fibulæ, 3 bronze rings, 12 spindle-whorls of terracotta (of which 4 were glazed), 1 spindle-whorl of amber and 1 of glass, 2 spindle-whorls of talc. Of iron there were 20 darts, 2 lance-heads, 8 knives, 7 keys, 1 lock, 8 buckles, 1 horse-shoe, 1 bullock-shoe, and 11 undetermined fragments. 5 fragments of glass vessels, 1 sword-handle of wood with bronze mountings, 4 bronze fragments, 25 pieces of pottery (3 with potter's mark), a small basin of brick, 52 coins (of which 46 were together), some slag, etc.

The objects in the upper stratum were mostly associated with the Oratorio di S. Alberto, built about the early part of the seventeenth century, and other mediæval buildings now entirely demolished. It was found to have been built over a still older church, which dated from the third century. A few of the coins were Roman, of about the same date, but the largest number dated from the end of the twelfth or commencement of the thirteenth century, and a few were of still later date. There was also a Christian cemetery found, containing a number of skeletons.

In 1879 Coppi published an account of further discoveries (B. 115), and among other objects he describes several stone moulds (10 for pins, 5 for lance-heads, and 7 for daggers), a stone weapon of nephrite, 2 flint knives, a weight of white marble, etc. Of bronze, he enumerates 12 pins, 3 needles, 20 dagger-blades, 5 chisels, 9 awls, and a small wheel ornamented with graffiti, besides a quantity of other objects of horn, bone, and pottery.

In 1885 the workmen came upon a grave embedded in the virgin soil underneath the terramara beds, supposed to be anterior to their formation. It was constructed of small unhewn stones, the space enclosed measuring 5 feet 10½ inches long, 1 foot broad, and 1 foot deep. Inside this grave was a human skeleton lying on its right side, with the head turned to the east. Associated with the body, as grave-goods, were the following objects:—a spatula of deer-horn, fragments of fossil shells, and some bits of carbonised vegetable matter (*Scavi del Modenese*, 1886, p. 11).

A few of the bronze objects found at Gorzano (Nos. 9, 12-14, and 19-23) are figured on Pl. XXXIX.

Casale Zaffanella and other Stations north of the Po.

The terramara known under the name of Casale Zaffanella lies 1¼ miles north of the Po, near the town of Viadana. The station was accidentally discovered a few years before 1886, by the brothers Pietro and Giacomo Tassoni, while making trenches for planting vines in a field of which they were proprietors. In the course of these operations they dug up fragments of pottery, which they brought to the Arciprête Antonio Parazzi of Viadana, already widely known as a skilled archæologist and the founder of an excellent museum of the local antiquities of the district. Some of the fragments of pottery turned out to be Roman, while others were undoubtedly pre-Roman. A preliminary investigation of the locality soon disclosed to the experienced eye of Parazzi the site of a terramara. A full report of the subsequent excavations and their results was published by Parazzi in 1886 (B. 146 (a)).

First of all, let me emphasise the fact that there was no mound at all to be seen on the landscape. The field was quite flat, and to reach the surface of the terramara deposits a stratum of the ordinary alluvial soil, from 1 to 2 feet thick, had to be passed through. The terramara beds then continued for a depth of 8 or 10 feet, underneath which came the subsoil on which the settlement had been originally founded. It is noteworthy that in one part of the site underneath the terramara beds proper, a peaty bed similar to that at Castione was discovered. To make the resemblance still more complete, this *terra uliginosa* also contained the remains of a palafitte. The piles were very well preserved, and some of them were then exhibited in the museum at Viadana.

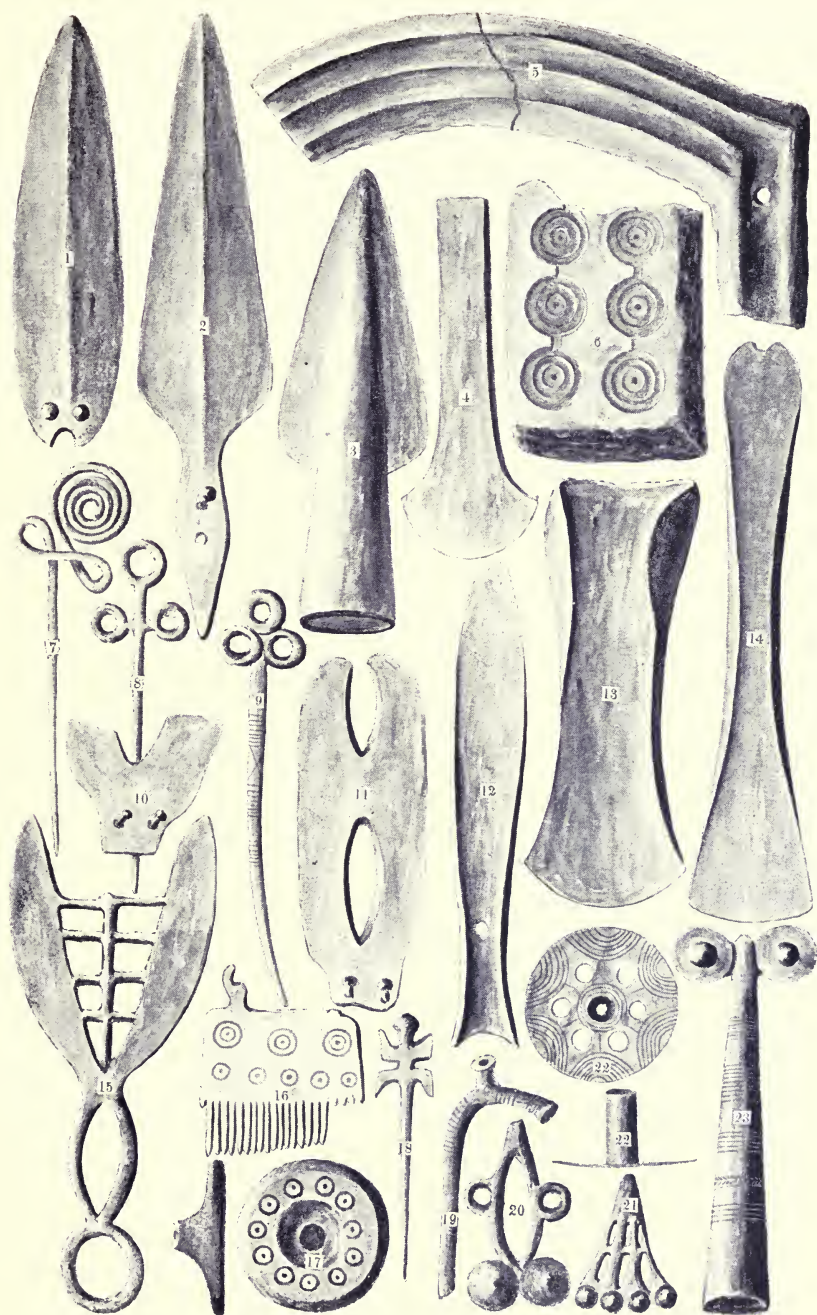
It was impossible, without enormous labour, to explore this settlement to any great extent; but by a few well-directed trenches Parazzi ascertained that it was quadrangular in shape, orientated to within 11 degrees of the meridian, and surrounded by a ditch and a dyke. The enclosure, exclusive of the dyke, had a superficial area of about 1 acre. Its four sides measured respectively 64 metres, 70 metres, 67 metres, and 73 metres, corresponding to the cardinal points N., S., W., and E. The dyke was 8 metres broad at its base, and 3.50 metres high, and showed evidence of having been added to on three different occasions. Its inner edge appeared to be steep, a fact which suggests that, as at Castione, there had been a *contrafforte* to prevent the earth from falling in. The ditch was 10.40 metres wide, and its maximum depth was 2 metres.

The underlying peaty stratum containing the piles occupied much of Parazzi's attention, and he goes largely into its minutiae. One curious fact which he records is that the dyke passed over its middle, leaving a considerable portion of the *terra torbosa* and palafitte outside the area of the terramara deposits. This undoubtedly suggests the idea that the palafitte existed prior to the terramara settlement. From the character of the relics we shall, however, see that both belonged to the same age and people.

On the surface of the terramara beds Roman remains were largely met with, and in one place they came upon a rectangular excavation measuring 18 square metres, containing ordinary



Montale. (All $\frac{1}{2}$ real size.)



Montale (1-6) and various other Terremare in the Vicinity. (All $\frac{1}{2}$ real size.)

earth, bricks, tiles, fragments of jars, and other Roman pottery. When this was cleared out there was found at the bottom a Roman pavement, and the stratified terramara layers could be distinctly seen in the perpendicular walls of the cavity. Clearly this cellar was excavated long after the deposition of the terramara beds.

Nor was the settlement of Casale Zaffanella a solitary example in the Viadana district. Already Parazzi had prepared a large map of the neighbourhood, which held a conspicuous position on the wall of his museum, showing no less than twelve terramara stations marked on it. Among these there is one at Cogozzo (B 129 (b)), situated about $1\frac{1}{4}$ miles from the town and within 200 yards of the Po, which presented the same features as that at Casale Zaffanella, and also contained traces of a palafitte. Its area was an orientated trapezoid covering about 1 acre, but it was completely buried under the accumulated mud of ages, its highest point being 31 inches below the surface. Parazzi estimates the measurements of its four sides at 71 metres, 44 metres, 71 metres, and 81 metres—the second and fourth in the above order being parallel. It was surrounded by a ditch and a dyke, the latter having its inner side perpendicular, showing that originally it must have had some kind of *contrafforte*. According to Parazzi the degree of orientation of this site did not point to the early spring as the date of its foundation, like that at Bellanda and some of the terremare of Emilia, but to autumn. However, owing to the irregularity of its perimeter, and the difficulty in taking measurements, he leaves the orientation of Cogozzo an undetermined problem.

The surrounding rampart was 12 metres broad at the base, 1.10 metres in height at its highest point, *i.e.* at its inner side, where there were indications of a *contrafforte* in the shape of decayed timbers. The moat was 8 metres in width, and 1.30 metres in depth. The terramara deposits were 1.40 metres thick.

Beneath the mass of alluvial deposits, which covered the whole station as well as the ancient land-surface, fragments of Roman pottery were found, some on the surface of the terramara, and others at various depths immediately outside the

moat. As regards the question where the original pile-dwellers crossed the Po to found the terramara settlements of Emilia, Chierici held that they came *via* Mantua, Bellanda, and Viadana. Parazzi, who took a great interest in this hypothesis, discovered several stations along the supposed route, notably Bellaguardo, Sabbioneta, Villa Capella, and, still nearer the Po, Cogozzo. This latter lies nearly opposite the terramara known as Balestri di Brescello, on the south side of the river, and only 1 kilometre distant from it. Hence, Parazzi regarded Cogozzo as the point of departure of the terramaricoli in their movements across the Po, the passage of which in those days would be no mean undertaking. (B. 129 (*b*) and B. 132 (*a*)).

Some of the objects found on the Viadana group of *terremare* are represented on Pl. XL. (Nos 1-13), the originals being preserved in the Parazzi Museum. Formerly the *terramara* deposits were supposed to be peculiar to the middle reaches of Parma, Reggio, and Modena; but later discoveries have upset this generalisation, as they are now shown to have a much wider distribution, embracing the provinces on both sides of the Po, and extending southwards as far as Taranto and some intermediate stations. (See Sketch Map, Fig. 157.)

Dr Giacometti first directed attention (1868) to the *terramara* settlements in the province of Mantua, and showed their similarity, both in structure and industrial remains, to those of Emilia. A few miles north-east of the town of Mantua there was found a group of seven or eight stations, regarding one of which, Bigarello, he stated that it contained the same kind of pottery and the same forms of stone implements as that as Castelnuovo in Emilia, the only difference being in the kind of stone used, the one being taken from the *débris* of the Alps and the other from the Apennines. Among the fragments of pottery he drew particular attention to the variety of handles, which showed all the transitional forms from knobs up to the most elegant *anse lunate*. "Havvene," says he, "di bicornute, di lunate, di bitubercolate, bilanceolate, cincinnate, transverse, appendiculate, ecc., quasi tutta in somma, la famiglia designata dal Mortillet (Les Terramares du Reggianaïs, 1865), colla speciale caratteristica di *anse lunate*."



Viadana and Stations on the North Side of the Po.
(Nos. 3 = $\frac{1}{4}$, 28 = $\frac{1}{2}$, and the rest = $\frac{1}{2}$ real size.)

In 1874 Marinoni gave an interesting account of the prehistoric remains of the district of Seniga, in the province of Brescia, especially those of the *terremare* at Chiavichetto and Gottolengo (B. 91). The former, the most interesting of a group of seven stations, is situated in the angle formed by the junction of the Mella with the Oglio, nearly 20 miles south of the town of Brescia. In excavating soil for making a dyke the workmen found objects of human industry—scrapers and saws of flint, three hatchets of serpentine, one large stone adze, various stone rubbers, etc., several fragments of worked horn, and an extraordinary quantity of broken pottery. The further objects discovered in this locality were chiefly of stone, rarely of bronze, and, according to Marinoni, they were very similar to those from the *terramara* stations of Bigarello and Pomella, to the east of Mantua.

The station at Gottolengo, discovered in 1871, is situated 5 miles to the north of Regona, and on the left bank of the Mella. Before being disturbed it presented the form of a flattish mound, which on examination yielded relics similar to those of the other well-known *terremare*, of which the following may be mentioned :—

Upwards of twenty arrow-points—pedunculated, triangular, or heart-shaped; some fragments of polished hatchets of serpentine; spindle-whorls of terracotta (Pl. XL., No. 17); one very large specimen, $4\frac{3}{4}$ inches in diameter (No. 28), was similar to another found at Chiavichetto; broken bones, portions of deer-horns, some of which were made into daggers and pointers; two bone combs ornamented with triangular lines and graffiti, similar to those from Castione and Noceto; an oval ring of wood, like the supports for vases (No. 25). Of bronze there were various tools and implements, of which spear-heads with a tang were most common. No. 19, showing one with two rivet-holes, a type which was also represented at Chiavichetto. A double-edged implement still held the rivet which had fixed it to a handle (No. 22). One arrow-point (No. 23) is similar to one found in the *terramara* station at Campeggine, in the province of Parma. Several fragments of pins, wires, spirals, and small plates of bronze. Among iron objects, all of which were much corroded, was a spear-

head (No. 24). Portions of greenish vitreous paste are also noted.

The following animals were identified among the osseous remains :—stag, ox, goat, sheep, horse, and pig.

Not only as regards the relics, but also in internal structure, the terramara stations on the north of the Po have been shown to be identical with those on the south side. This we have already seen to be the case by the admirable description of Casale Zaffanella by Parazzi. But the point was first established by the indefatigable researches of Chierici, who, in 1881, along with a few other antiquaries, explored the stations at Bellanda and Villa Cappella, in the commune of Gazzoldo, about 10 miles west of Mantua. Here all the characteristic features of the terremare, so far as they were then known, viz., the surrounding dyke, palafitte, and orientation—were clearly established (B. 129 (a)).

Castellaccio.

The best investigated terramara in the Bologna district is that at Castellaccio, about $\frac{3}{4}$ mile to the south of Imola. The deposits repose on an isolated elevation on the right bank of the river Santerno, and rising nearly 120 feet above its bed ; but on it there are no remains of ancient stone buildings, as the name would seem to imply. The hill is of yellowish sand, belonging to the upper Pliocene. Scarabelli, who in 1887 published an illustrated monograph of its peculiarities and the antiquities found on it (B. 149), states that piles were numerous, though many had disappeared by decomposition, only traces of their holes being then detected. Some of the piles were large, measuring over a foot in diameter, and they were placed irregularly. No less than twenty-six hearths were met with at different levels, and those on the same level were from 4 to $6\frac{1}{2}$ metres apart.

The peculiarity of this terramara is that its antiquities would appear to belong to both the Stone and Bronze Ages. The flint implements included about twenty roughly chipped tools like scrapers, some badly made arrow-points, and saws resembling those found in the palafittes in the Mincio. Altogether two hundred and sixteen worked flints and about six hundred chips and cores were collected, some polished stone axes, together with four portions of perforated implements.

Among about one hundred and twenty spindle-whorls of burnt clay there was only one ornamented. There were various implements of stag-horn and bone, a few of the former being perforated and apparently used as axe and hammer heads, like those from Gorzano. Some perforated shells are also recorded.

The pottery was precisely similar to that usually found on the well-known terramara deposits of Emilia, showing various forms of handles, horn-like projections, perforated knobs, etc.

The total number of bronze articles amounted only to seven pieces, and included a small sickle, a winged celt (*coltello-ascia*), and a small dagger with two rivets—the rest being of an undetermined character. Two objects of *pietra ollare* (a small spindle-whorl and a dish turned on the wheel) and a bronze buckle were found among the disturbed beds on the surface.

The above remarks on Castellaccio were published, in 1890, in my *Lake-dwellings of Europe*. Since then, however, a critical school of archæologists, headed by Professor Pigorini, have advocated the theory that no habitable site, whatever its cultural remains may be, is to be regarded as a true terramara without exhibiting all the structural features disclosed at Castellazzo, where, as already explained, some remarkable discoveries have been made. Hence some recent writers have argued that Monte Castellaccio and several other stations, both north and south of the Po, are not really terramara stations, as was formerly believed, but hut-villages inhabited by an earlier race than the terramaricoli. As the problem thus raised will be discussed later on when we come to consider the distribution of the terramara civilisation, it is unnecessary to deal with it here.

Lacustrine Station at Offida.

Up to 1890 no decided remains of either lake-dwellings or terremare were known in Italy beyond the Po Valley, and even the obscure indications that had been recorded left it doubtful whether they could be classified as examples of either of these modes of habitation. Among them, the only station which seemed to me worthy of being noticed in 1890 was a lacustrine site discovered in the Piceno district (Central Italy), and described by Pigorini in 1879 (B. 117 (b)). In view of the more

recent discovery of a terramara settlement at Taranto, which suggests that a colony of the terramaricoli from the Po Valley must have passed near that locality on their way southwards, the Piceno station demands a more careful consideration than was then given to it.

In a narrow valley about 2 kilometres north-east of Offida, there was formerly a small lake, which in the course of time became drained by the erosion of a stream which falls into the Tresino. Within the dried-up bed of this lake the Marquis Allevi discovered a rectangularly shaped wooden platform, 48 metres long, 14 metres broad, and 0.60 metre thick, buried in a deposit of sand and clay to a depth of 5 metres. Beneath this platform there was an accumulation of lake-mud, 3 metres thick, in which were found fresh-water shells, charcoal, bones of animals, fragments of pottery, worked flints, and other evidence of human occupancy. The platform was constructed of large tree-trunks deprived of their branches, and laid horizontally at intervals of 1.30 metres, above which were placed smaller beams and branches without any apparent order. The interstices were filled up with rushes, twigs, and mud, and the whole covered over with a layer of moss. On and underneath this platform were found flint implements—chips, nuclei, portions of a borer and a knife (triangular on section); some calcined, rounded stones; the bottom of a hand-made dish and other fragments representing twelve vases, some being made of fine and others of a coarse paste (only one little vessel, 11 centimetres high, being entire); about twenty cakes of crude bronze which had been cast in circular moulds, each weighing from 150 to 700 grammes, besides a quantity of indeterminate bronze fragments; several portions of moulds recognised by Allevi as belonging to two separate moulds, one for casting a flat axe, and the other for a flanged celt. The pottery was of two distinct types, the larger specimens being black within and reddish without, while three fragments were entirely black. Only one dish-handle was found, and its shape was that of a semicircle. One fragment showed a recurved lip, another was ornamented with a zigzag ornament in incised lines, and a third of larger dimensions had protruding knobs on its surface. The long bones of animals, which belonged exclusively to

deer and oxen, had been split for the extraction of their marrow.

Most of these relics were found in the lower stratum of the lake-mud deposit beneath the platform, having apparently been dropped into the water from the hands of their original owners. It may also be observed that among the deposits of sand and clay, which had subsequently accumulated over the platform to a depth of 5 metres, were found some Roman objects.

The precise facts collected during this investigation are not sufficiently copious to enable us to speak definitely of the exact nature of this settlement. The large tree-trunk logs on which the habitable platform rested were not, it seems, supported on piles; and, hence, the investigator was inclined to regard it as a floating island or raft which rose and fell with the fluctuations of the water in the lake. Such a suggestion is by no means improbable, nor unparalleled in the history of archæological researches, as is proved by the discovery of a floating station in a peat-bog in the island of Zeeland (Denmark), supposed to be even earlier than the age of the kjökkenmöddings (*Congrès Préhistorique de France*, 1905, p. 244). See p. 279.

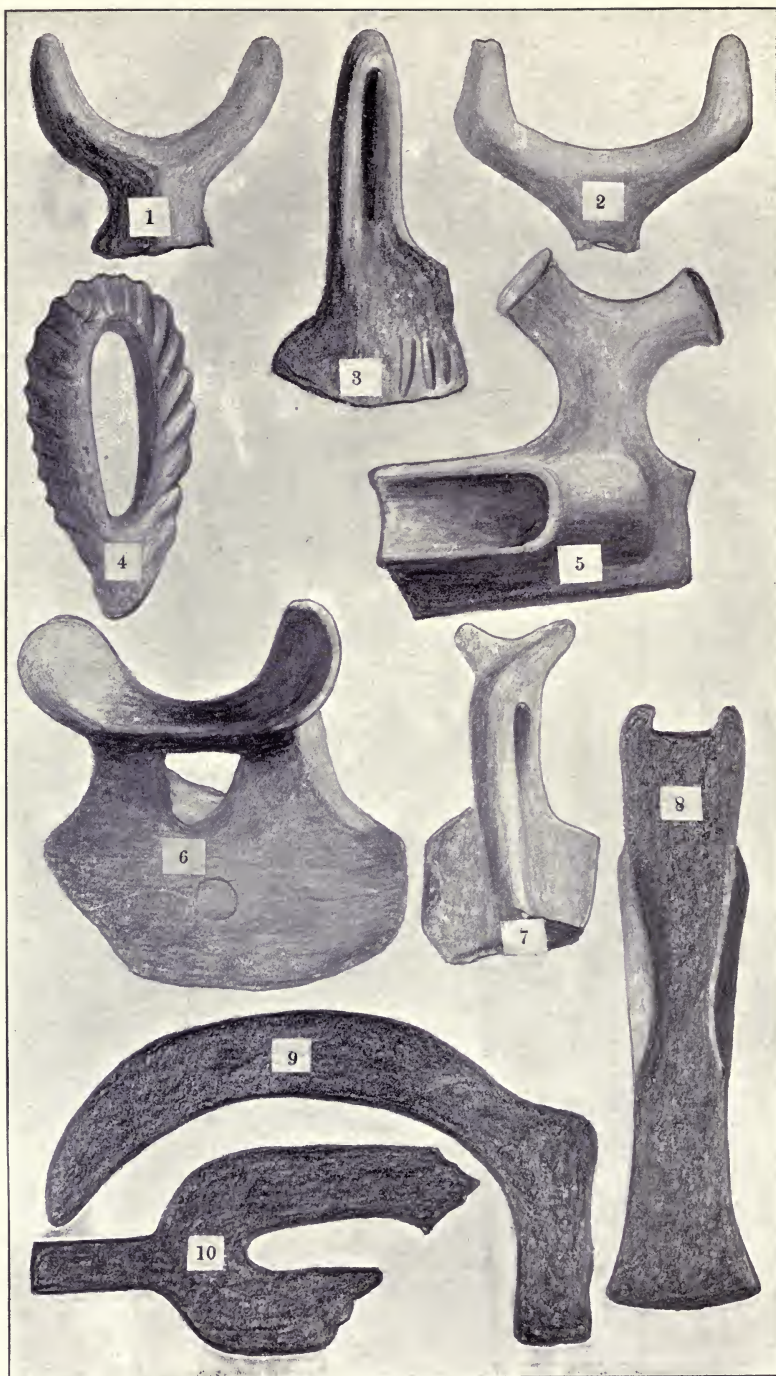
Terramara at Taranto.

In 1899 Professor Quintino Quagliati discovered a terramara settlement at Taranto. The site lies a little to the north-west of the city, at a place called *Scoglio del Tonno*, where the rock was being quarried for building purposes. Quagliati observed that lying over the surface of this rock there were artificial deposits of earth, some 2 metres thick, which contained industrial remains and other evidence of human occupation. After some tentative diggings he ascertained that they were disposed in three separate beds of stratified materials, each representing a different phase of Italian culture. The upper bed contained the remains of huts, fragments of a light yellowish pottery with geometrical decorations, recognised as belonging to proto-Corinthian types, and a human figurine or goddess, said to be of Mycenæan origin, but which can be paralleled by several figurines found in the Neolithic station of Butmir in Bosnia (see Pl. LXVII.). The bed immediately below this was of considerable thickness, and in it were found

pottery, bronze implements, and other remains almost identical with the most characteristic relics found in the *terremare* of the Po Valley. The objects disinterred from the third, or lowest bed, consisted of the refuse of flint and obsidian workings, hut-foundations, stone hearths, potsherds, etc.—all common relics of the Neolithic Age. In the course of systematic excavations important structural features—piles, platforms, huts, moat, rampart, etc., came to light, showing that the middle bed had been the site of a true *terramara* settlement. One of the huts was rectangular, 15.50 metres long by 5 broad, and had a kind of apse at the west end, and a portico at the other, with a kitchen opening on the central room. The walls were of wickerwork plastered over with clay, the foundations of which still remained, as well as portions of the clay castings of the wickerwork. In the kitchen were found hearthstones of earthenware and remains of a stove or cooking apparatus (Fig. 156, No. 6). The stove was covered with a perforated top, and had a square opening near its base. Remains of other two similar stoves were observed. Beneath the floor of this chamber the platform of an older palafitte was detected, thus proving that successive occupations, on the principle of raising the habitable area so as to get clear of the accumulated *débris*, were practised by the *terramaricoli* of Taranto, precisely the same as by those of the Po Valley.

According to Quagliati's description of his researches the station on the Scoglio del Tonno had all the structural features of the *terremare* north of the Apennines, viz., a moat, rampart, *contrafforte* (partly of wood and partly of stone), a palafitte, and finally a street 2 metres wide, running from east to west, supposed to be the *Decumanus*. These features were particularly well marked on the west side, which had a north and south direction. The moat, measuring about 5 metres wide and 3 deep, was partly excavated in the soft rock, and had a portion of its outside lined by a roughly built limestone wall.

From the structural analogy of this *terramara* to those of Emilia, Pigorini argues (*B.P.*, xxvi., p. 12) that it supports his theory, viz., that whatever the nature of the site may be, whether on a hill or on the plain, there are certain characteristic features that are always adhered to.



Taranto. (Nos. 1-7 = $\frac{1}{2}$; 8, 9, 10 = $\frac{5}{16}$). (After Quagliati and Pigorini.)

Plate XLI. illustrates some of the objects which both Pigorini and Quagliati regard as satisfactory evidence that the people who constructed and inhabited the terramara settlement at Taranto towards the end of the Bronze Age lived under the same civilisation as prevailed in the Po Valley, from which they are supposed to have emigrated. Of the pottery, Nos. 1, 2, 5, 6, and 7 are good specimens of the *anse cornute*, and perfectly identical, both in technique and material, to those of the ordinary *terremare*. The two handles Nos. 3 and 4, are of the same material, but only the former has hitherto been met with in

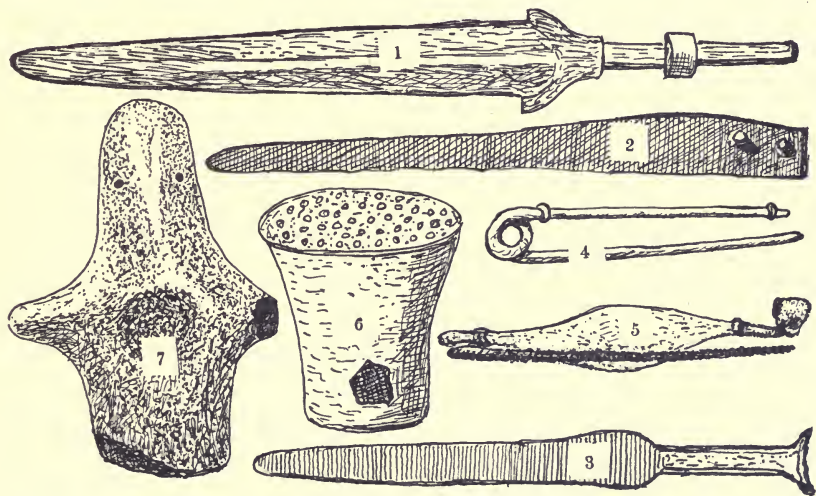


FIG. 156.—Various Objects found on the Terramara of Taranto.
(No. 1 = $\frac{1}{2}$; 2, 4, 5 = $\frac{1}{3}$; 3 = $\frac{2}{3}$.)

terramara deposits, while the latter is probably due to foreign influence. Quagliati figures several bronze implements, viz., a winged celt, a sickle, and a double-edged razor (Nos. 8 and 10), all of which are familiar objects in terramara collections; also a short sword (Fig. 156, No. 1), a one-edged knife (No. 2), a dagger with a solid bronze hilt having raised edges (No. 3), and two violin-bow fibulæ (Nos. 4 and 5). Pigorini regards these as evidence that the emigration of terramara folk from Emilia to lower Italy took place towards the end of the Bronze Age. The sword is not among the objects found on early terramara sites, and Pigorini could point to one only similar to it, viz., one found on the station of Servirola di Sanpolo (Emilia) (*B.P.*, i.,

tav. vi., No. 7), a late settlement inhabited at the end of the terramara civilisation. The dagger and one-edged knife are not terramara types, and therefore their presence on the Scoglio del Tonno points to a late period. We need not dwell on the two fibulæ, as they can be paralleled by similar specimens found not only in the tombs of Mycenæ (see Tsountas and Manatt, *The Mycenaean Age*, pp. 163-4), but also in the terremare of Emilia and in the palafittes of Lake Garda.

The clay idol (Fig. 156, No. 7) is said to indicate the influence of Mycenæan culture, although it does not bear much resemblance to Mycenæan figurines. It is made of artificial paste of a brown colour, with rounded head and stumps of arms stretched horizontally. A long angular nose, without any defined mouth, and eyes represented by two picked holes, complete its human likeness. Quagliati (B. 185, p. 288) thinks it impossible not to recognise in this rude image the effect of Mycenæan culture, for the first time imported into the locality during the last phase of the Bronze Age.

The finding of a female idol, the genuine product of Mycenæan art, in the upper bed, as already mentioned, gives countenance to the supposition that the rude figurine found on the terramara deposits was copied from an early Mycenæan specimen which had found its way to south Italy while the terramaricoli still occupied their citadel on the Scoglio del Tonno. (For further details, see B. 185, pp. 6, 285; and B. 186, p. 411.)

General remarks on the Terramara Settlements.

In the above sketch of the progress of the scientific investigation of the terremare I have selected a few typical examples for special description. We have seen that in one, viz. Montale, the accumulated débris stood as a clear mound on the surface of the surrounding plain, while that of Gorzano and Montata dell' Orto rested on natural hillocks. The Castione deposits also assumed the same form, but in this case the mound was only partially above the plain, the rest being as it were buried in it. The tops of the piles found in its peaty stratum (*terra uliginosa*) were on an average 3 feet below the

level of the present surface of the plain, and the lowest portion of this bed was a couple of feet still lower. In the case of Casale Zaffanella there was no mound visible, but on examination the remains of the settlement were found to be disposed precisely similar to those of the *terremare* above ground, only the mound was completely submerged in a sea of hardened mud. The explanation of this will be readily perceived when we remember that the amount of submergence respectively shown in these instances is in the inverse ratio to their distance from the lower parts of the plain and its great water-channels. The yearly inundations of the Po and its tributaries extend far and wide, each adding a film of mud to previous deposits. Thus, in the course of ages, the surface of the plain has become considerably elevated. The increase of silt since the *terramara* settlement of Casale Zaffanella was founded, amounts to $12\frac{1}{2}$ feet—a depth sufficient to cover the highest part of the mound. It is difficult to say how much this levelling-up process is accountable for the scarcity of these stations in the lower parts of the Po Valley. That they existed, however, in close proximity to the river is amply proved by the stations at Viadana, as well as one or two others; for example, that at Brescello in the Parmensian district.

The discovery of the *terramara* at Taranto has opened up questions of far-reaching significance by bringing into focus the products of foreign civilisations, and thus supplying data which may help to bring these contemporary civilisations within the pale of absolute chronology.

Extent.—As to the actual dimensions of the *terramara* settlements it is difficult to procure accurate measurements, for several reasons. In many instances they are either built over by modern buildings, or there is nothing to distinguish their *débris* from the surrounding soil without making extensive excavations. Even when the site is a clearly defined mound, as at Montale, one estimate may differ from another, according as the area of the surrounding dyke is or is not included in the measurements. Generally speaking they are quadrangular in form, and, according to Chierici (B. 105, p. 105), their average superficial area is *tre ettare* (about seven acres). But their respective areas vary very much, as will be seen from the

dimensions of the following stations, in addition to those already given, whose measurements have been accurately ascertained:—

Casaroldo (Parma), 200 by 160 by 3.70 metres (B. 100, p. 360).

Parma, 300 by 23 metres (Strobel and Pigorini, *Seconda Relazione*, p. 149).

Castiglione di Marano (Modena), 114 by 64 by 3 metres (B. 138, p. 19).

Pragatto (Bologna), 200 by 150 by 3 metres (B. 129, p. 138).

In his description of Bellanda (Mantua), Chierici observes that the *bacino* was a rectangle 96 metres across, giving an area of about two acres, to which he adds, “*ampiezza ordinaria delle terremare*” (B. 129, p. 80). On the other hand, the two whose measurements have been accurately given by Parazzi, viz., Cogozzo and Casale Zaffanella, show a superficial area of only half this size, a fact which induced Parazzi to observe (B. 146, p. 4) that the terremare in Viadana seemed to be smaller than those of Emilia and that at Bellanda.

Number.—The total number of terramara stations in Italy is over 100, which are thus (approximately) distributed among the provinces—Parma, 30; Reggio, 25; Modena, 16; Bologna, 5 or 6; Mantua, about 20; Brescia, 8; Plaisance, 1; Taranto, 1. (See Fig. 157.)

Relics.—More trustworthy knowledge of the social conditions and general culture of the terramaricoli is to be derived from a study of the remains of their villages than if they had come within the scope of the earliest written records. The ordinary débris here accumulated, such as the more imperishable portions of food-refuse, stray objects, etc., are arranged in chronological sequence like geological strata, the more recent being on the surface, and the oldest at the bottom. Wherever an object of human industry happened to drop, there it remained, marking in all time coming its relative place in the duration of the community. The industrial remains show that these people founded their dwellings in the early Bronze Age. The presence of a few flint implements and other objects of the Stone Age is quite in harmony with the usual overlap of the

relics of dying customs in the transition period. That the weaving of cloth was largely practised by them is proved by the extraordinary variety and abundance of spindle-whorls and loom-weights. They made ornamental buttons, pins, combs, and other objects of terracotta, horn, and bone. Wood



FIG. 157.—Sketch Map of the Distribution of Terremare in the Po Valley.

was largely used in the manufacture of a great variety of things, as handles, dishes, spoons, flooring, etc. (B. 113 (e)). That they manufactured their implements and ornaments of bronze is proved by the number of foundry objects collected, as bronze slag, stone moulds, etc. (Pl. XXXV., Nos. 14-17).

We have already seen that the terramaricoli had an extensive knowledge of the ceramic art. The vessels in daily use were

no less varied and elegant in shape than our modern jugs, teapots, cups, bowls, basins, saucers, flower-vases, etc. Some had everted rims, and the majority flat bases. The ornamentation consisted of parallel and wavy ridges, knobs (sometimes perforated), incised triangles and crosses, circular or semi-circular impressions, etc. But most characteristic are the horned appendages attached to the tops of the handles (Pl. XXXVIII., Nos. 21 and 22), which were of the most varied and fanciful forms. These remarkable handles are not found on pottery outside the area of the *terremare* and certain districts influenced by the civilisation of their inhabitants. Nor is the fully developed *ansa lunata* found in the lake-dwellings within this area, with the exception of the stations at Peschiera, Mincio, and Il Bor, in the south-east corner of Lake Garda.

Organic Remains.—The principal food of the *terramaricoli* consisted of the produce derived from agricultural and pastoral farming. An exhaustive analysis of their vegetable remains has not yet been made; but, from the occasional stores of grain, chiefly in a carbonised state, and other provisions met with, they are believed to have been in the habit of eating the following seeds and fruits:—wheat (two varieties), beans, millet, acorns, beech-nuts, apples, pears, sloes, cornel-cherries, brambles, pistachio-nuts (*Staphylea pinnata*), hazel-nuts, and grapes (*Vitis vinifera*). Flax was largely cultivated, and its seeds were supposed to have been used as food, while of course its fibres were converted into thread, ropes, and cloth. Among the vegetable remains from Casale Zaffanella submitted to Professor Oreste Mattiolo in Turin, wheat, and both the seeds and wood of the vine were recognised.

As regards the domestic and wild animals on which the *terramaricoli* subsisted, we are in possession of more definite information, owing to the persevering watchfulness of Professor Strobel. The following is his corrected list down to the year 1883 (B. 136 (c)) :—

Erinaceus europæus, L. (hedge-hog). Gorzano.

Ursus arctos, L. (bear). Castellaccio, Gorzano, Campeggine, etc.

Vulpes vulg., Brisson (fox). Castellaccio, Gorzano, Montecchio, Ronchi di Viadana.

Canis familiaris, S. (domestic dog).

var. *Spalletti*, Strob. Montecchio, Castione (?), Cogozzo (?), Casale Zaffanella.

„ *palustris*, Rüt. Common.

sub. var. *matris optima*. Gorzano, Montale, Montecchio, Demorta.

Lupus vulgaris (wolf). Castellaccio, Redu.

Meles vulgaris (badger). Montale.

Martes foina, L. (polecat). Gorzano.

Felis catus, L. (wild-cat). Gorzano (?), Montale (?).

Sus scrofa (*ferus*), L. (wild boar). Widely spread, but not common.

Sus palustris, Rüt. (domestic pig). Common.

Asinus africanus, Sans. (ass). Common.

Equus caballus (horse). Widely spread and not rare. The remains are of two races, one large and the other small.

Capreolus vulgaris (roe). Less common on the south side of the Po.

Cervus elaphus, L. (deer). Common.

Dama platyceros, Plinius (fallow-deer). Gorzano. Very rare.

Cervus tarandus (reindeer). Gorzano (Coppi).

Hircus ægagrus, L. *palustris* (goat). Widely spread and common.

Ovis aries, L. (sheep). Emilia, Mantua, Brescia.

var. *palustris*, Rüt., *capricornis*, Can. Not rare.

„ *O. musimom*. Castellaccio.

Bos primigenius, Boj., *domesticus*. Emilia, Mantua, and Brescia. Not common.

Bos brachyceros, Rüt. Very common as domestic cattle.

Lepus timidus (hare). Gorzano (Coppi).

Mus sylvaticus (wood-mouse). Castione.

Hystrix cristata, L. (porcupine). Portion of a quill of this animal was found in the socket of an arrow-head of bronze from Campeggine.

Castor fiber, L. (beaver). Castellaccio, Cogozzo.

Frugilegus segetem (raven). Gorzano (Coppi).

Gallus domesticus, L. (domestic fowl). S. Ambrogio, Gorzano, Bismantova, Castellazzo di Fontanellato, Parma, Bozzoletto.

Ciconia alba, W. (stork). Montale.

Ardea cinerea, L. (heron). S. Ambrogio.

Anser segetum (wild-goose). S. Ambrogio, Poissioncella near Viadana.

Anas boschas, L. (duck). Montale, Parma, Cogozzo.

Emys europæa, Sch. (tortoise). Gorzano, Montale, S. Ambrogio (Boni), Campeggine (Chierici), Casale Zaffanella (Parazzi).

Bufo (a species of toad).

Esox lucius, L. (pike). Parma, Casale Zaffanella (Parazzi).

As coming under the category of organic remains, I may add that a great variety of shells, both of living and fossil species, are found in the terramara deposits. Many of them are perforated, especially the more ornamental fossil varieties,

and were undoubtedly used as ornaments. Some of the flat shells of bivalves give a tingling noise when struck, and are therefore supposed to have been used to produce some kind of musical sounds. Land and fresh-water species were also, no doubt, used as food. Coppi in his monograph (vol. ii., p. 100) describes and illustrates a variety of the more striking forms collected in Gorzano; and, in summing up his list, he states that four hundred and seventy-nine were of marine origin (either recent or fossil), three hundred and eighty-eight belonged to fresh-water species, and thirty-one were land shells.

From the existence of the horny cases of various kinds of insects, some living in air and others in water, and their larvæ in various stages of evolution, Pigorini adduces an argument against the supposition that the *bacino* was kept constantly filled with water. (See Strobel, B. 27, p. 18, and B. 28, p. 36; Pigorini, B. 133, p. 38; Parazzi, B. 146, p. 54.)

The protracted discussion as to whether or not amber has been found in the *terremare* proper was finally settled by the statement of Pigorini that, in his explorations (1877) at Castione, it was found in the lowest stratum:—"Ora siamo certi che l'ambra si trovo in Castione sepolta nello strato infimo, e colla certezza che vi fosse penetrata nei giorni in cui lo strato stesso si formava" (B. 133, p. 51).

As early as 1863 Strobel and Pigorini announced the discovery at Castione of a couple of amber beads, but as their position in the *débris* had not been determined, no inferences could be drawn from this discovery. In 1871 Coppi found a large one (*fusaiuola*) at Gorzano; and later, another of the same kind. One was also found at Montale, and another at Casinalbo. As these are all the records of amber up to the decided discovery of Pigorini, it is clear that it was a very scarce object among the *terramaricoli*. The number from Montale, however, amounted in 1890 to sixteen, the largest of which is $1\frac{3}{4}$ inches in diameter. (See B. 94, p. 183; B. 101, p. 29; B. 105, p. 28.)

Age.—In the spring of 1865 Pigorini explored and described a station in the district of Parma called Fontanellato, which at the time he considered to be a *terramara* containing a fascine structure belonging to the Iron Age (B. 41). In

the excavations which were conducted here the following different strata were exposed from above downwards:—(1) 2 feet of soil; (2) a bed of alluvial deposits, 4 inches thick; (3) a bed of materials similar in colour and composition to those of the ordinary terramara deposits, 1 foot 10 inches thick; (4) a mass of mixed materials, 2 feet 7 inches thick, containing roots, branches, leaves, etc., mixed with clay, together with pottery, short piles, charcoal, bones of animals, shells, fruits, seeds, etc.

The objects of special interest collected were fragments of coarse pottery, made, however, on the wheel, and particularly some vessels made from potstone; a large stone splinter, showing marks of usage; a bronze ring, and some iron slag.

In 1883 Pigorini recurred to the remains at Fontanellato (B. 134), and explained that, owing to the great progress made in the investigations of the terramara deposits, and the additional light thrown on the subject, he had come to the conclusion that the station at Fontanellato was not a direct continuation of the terramara system which prevailed in the Bronze Age, but a “palafitta barbarica,” in which he saw practical evidence of the incursions into the Po Valley many centuries later, of the northern hordes of barbarians which gave the final *coup* to the Roman Empire. Nor does the station at Fontanellato stand as an isolated example of these later structures. Chierici found one at Marmiolo, in the district of Reggio (B. 136(b)). Another is recorded by Cornalia (*Atti della Soc. It. di Sc. Nat.*, vol. vii.), and Pigorini thinks that several others which have been more or less described belong to this class of remains. With these exceptions there are no terremare of the Iron Age, and the system appears to have completely fallen into desuetude about the beginning of the Iron Age in Italy.

CHAPTER XIV

LACUSTRINE PILE-STRUCTURES IN THE PO VALLEY

Introductory. Lake Varese. Turbaries of Biandrono, Cazzago-Brabbia, and Pustenga. Lake Varano. Lake Ternate. Turbaries Mombello, Valcuvia, and Brenno. Lakes Lecco, Annone, and Pusiano. Turbaries Bosisio, Capriano, Maggiolino, Mercurago, Borgo-Ticino, San Martino, Lagozza, Lagazzi, Iseo, and Polada. Lake Garda. Turbary Cascina. Lake Fimon. Fòntega. Arquà Petrarca.

BEFORE coming to a decision as to the origin, chronological range, and racial affinities of the terramaricoli, it is necessary to examine for comparative purposes the archæological evidence derived from contemporary habitations. Prominent in importance among collateral remains of this kind are the pile-structures found in lakes and peat-bogs throughout the Po Valley. The purpose of the present lecture is to show the close relationship between the archæological materials found on the sites of these lacustrine abodes and those disinterred from the *terremare*, with the suggested inference that the lake-dwellers were the ancestors of the terramaricoli.

On the 20th of July 1860, M. G. de Mortillet wrote a letter to Sig. Cornalia, president of the Italian Society of the Natural Sciences at Milan (*Atti della Soc. It. di Sc. Nat.*, vol. ii., p. 177), in which, while mentioning the discoveries made in Switzerland, he suggested that similar antiquities might be found in the lakes of Lombardy. The reading of this letter led to a discussion which at once elicited one or two statements of archæological importance. The vice-president, Sig. Antonio Villa, recalled the fact that a bronze axe-head and some flint arrow-heads were found in the turf bog of Bosisio, at a depth of 10 feet, which were described and figured in a Milan journal, *Il Fotografo*, 2nd August 1856. The president also mentioned that he possessed weapons of a similar character, which were found, along with some human bones, in the peat-bogs of Brenna. Shortly afterwards the celebrated naturalist Gastaldi, in an article in *Il Nuovo Cimento*, directed attention to certain antiquities which the turf-cutters were in the habit of finding in the "torbiera di Mercurago" (B. 3). Subsequently Gastaldi visited this locality, and along with Prof. Moro of Arona (who first

recognised the importance of the objects in question), made further researches in the peat at Mercurago, the result of which was to leave no doubt that they had here to deal with the remains of a true palafitte analogous to the pile-dwellings in the Swiss lakes. During the next two years Gastaldi's report was considerably enlarged by further finds at Mercurago (B. 4 and 7).

About the same time that these discoveries at Mercurago were being made the existence of a palafitte in Lake Garda was surmised from the finding, at various times, of bronze implements and weapons in the harbour at Peschiera; but nothing further of a very definite character occurred till the summer of 1863, when Professors Desor and De Mortillet visited Lombardy in search of lake-dwellings. These eminent archæologists were joined by Professor Stoppani, and the immediate result of their investigations was the discovery of several settlements in Lake Varese and elsewhere (B. 14). Since then the lacustrine stations south of the Alps have greatly increased in number, there being now scarcely any of the smaller lakes and turbaries of North Italy that have not yielded more or fewer remains of this character.

The distribution of lake-dwellings in Italy is confined to the Po Valley, and as the course of the river is practically from west to east, it is convenient in describing its chief lacustrine remains to follow the order thus suggested, more especially as those in the eastern portion of the basin have certain characteristics which are not found in those of Western Lombardy. Accordingly we begin with Lake Varese, the settlements of which appear to have been the most important among the western group.

Lake Varese.

Lake Varese is irregularly shaped, about $5\frac{1}{2}$ miles in length, and less than half that in breadth. It occupies a somewhat shallow basin, its greatest depth being 85 feet, and, although bounded on the north by high hills, its banks are generally flat or shelving. Its surface is 770 feet above sea-level, and 134 feet above that of Lake Maggiore, to which its surplus water is carried by the Bardello, a stream which has its outlet at the north end of the lake. The district around is rich and well cultivated, except on the south side, where the lake becomes contiguous with an extensive peat-bog, called "torbiera della Brabbia." When Stoppani and his illustrious friends, along with Desor's experienced fisher, Benz, commenced their lacustrine explorations in Lombardy, they selected Lake Varese to start with, on account of the suitability of its shores for such

structures. On the very first day (21st April 1863) their labours were rewarded by the discovery of the sites of two settlements—one opposite the village of Bodio, and the other at

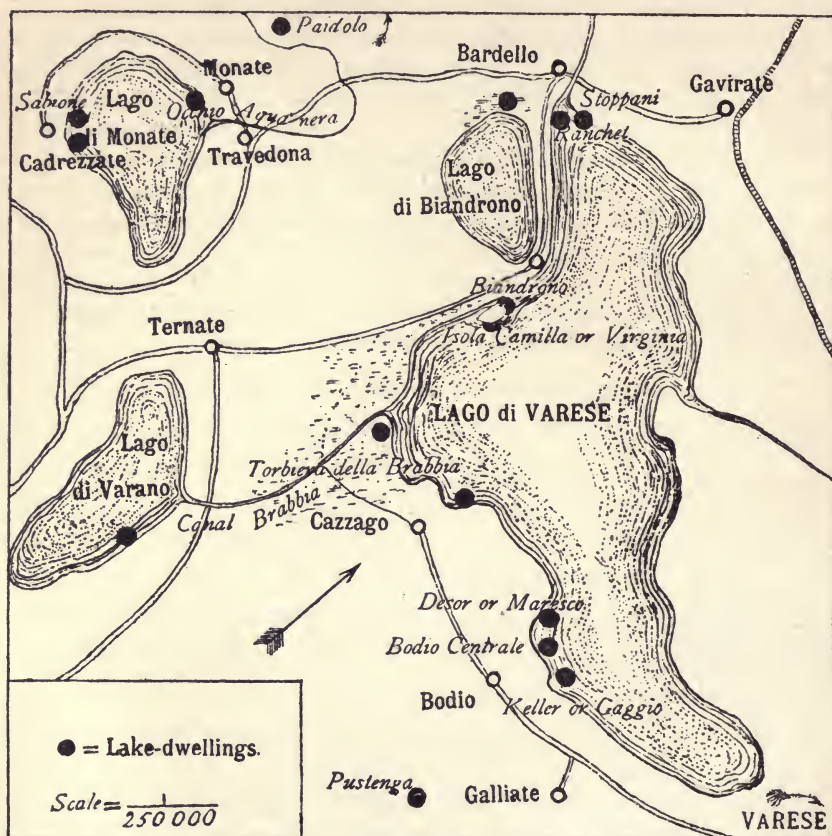


FIG. 158.—Lake Varese and Surrounding District.

the south-east side of the little island then called Isolino, or Isola Camilla, but now I. Virginia.¹

Professor Stoppani continued his researches after the departure of his friends, and made further discoveries, not only in Lake Varese, but in some of the other lakes of Lombardy. In November of the same year Captain Angelo Angelucci, of Turin, was attracted to the scene of these discoveries in Lake Varese, and henceforth took an active part in the investigation of its palafittes (B. 10). Nor must I omit to mention the

¹ So called by the Congress of Italian naturalists who met here in 1878, after Virginia Ponti, wife of the proprietor.

Abate Ranchet among the list of these early explorers. He discovered in the same year not only a new station on the south side of the outlet, but also, in the following year, two others in the adjoining lake of Monate (B. 24). At the end of the first year's explorations we find, from the reports of Stoppani and Angelucci, that no less than six stations were located in Lake Varese, all situated on its south-western shore. In 1868, when Dr Camillo Marinoni published his report on "Le abitazioni lacustri e gli avanzi di umana industria in Lombardia" (B. 55), the number had increased to seven. Although no addition has since been made to their number, much attention has been given, especially in these later years, to their investigation. The sketch map of Lake Varese (Fig. 158) shows the names and the respective positions of these settlements.

Isola Virginia.—This is a small egg-shaped island lying along the west shore, from which it is distant about 80 yards. It is 240 yards long, with a maximum breadth of 100 yards, and contains besides some fine trees, a house with two storeys, the upper of which is converted into an archæological museum, and at a little distance a café for the convenience of the visitors that frequent the locality. Its area is nearly 3 acres, and its highest point is barely 8 feet above the average level of the lake.

Piles were discovered in the lake at the south-east side of the island, in a space extending along its margin for about 100 yards, and about half that distance in breadth. When I visited the locality in 1889 the heads of piles were readily seen through the water, just cropping above the sandy bottom. In some cases it was difficult to distinguish them from stones; but a poke with the oar or a long stick at once determined which they were. Professor Stoppani, in his first report (B. 14), describes this as a *steinberg*; but the idea of the whole island being artificial—an idea first suggested by Desor, who found analogous instances in the Rosen Insel, in Lake Starnberg, in the little island at Inkwyl, and in the Irish crannogs—gained strength by the discovery of similar stumps of piles on its north-west side. Although the local antiquaries—Ranchet, Regazzoni, Quaglia, Castelfranco, and others—occasionally visited these lacustrine stations, and made con-

siderable investigations, with the result of adding to their private collections, it was not till 1878 that any systematic researches were made with the view of testing Desor's suggestion that the island was a gigantic crannog. This was first attempted by an Englishman, Mr W. K. Foster, of London, who happened to be residing in the neighbourhood. In carrying out the necessary excavations he had the assistance of Ranchet and Regazzoni, both experienced investigators of lacustrine antiquities. Five trenches, covering on the aggregate about 80 square yards, were dug in different parts of the island, and in all these, piles, fragments of pottery (one of which had the impression of plaited reed-work), and various other relics of human industry, were encountered. In the sections presented by these trenches the following strata were successively passed through :—

- | | |
|---|-----------|
| 1. Surface soil for about | 14 inches |
| 2. Vegetable mould, of a dark colour | 10 " |
| 3. Sand and gravel | 24 " |
| 4. Sand and earth, with much organic débris | 16 " |
| 5. Sand and mud (the original lake-sediment) | |

The most noteworthy objects collected in these operations were the following :—In the first layer a Roman coin of Marcus Aurelius, and a portion of a mould for a socketed lance-head (Pl. XLII., No. 19). In the second, two fragments of bronze. In the third, two polished stone celts, with a portion of a third, and two clay weights. In the fourth, a worked flint set in a wooden handle, two bone pins, and some sharpening-stones.

The piles were evidently in their natural position, and the conclusion that the entire island had been a pile-dwelling was irresistible; but the questions when and by what means the transformation had been accomplished were as obscure as before. Mainly for the purpose of clearing this matter, Sig. Ettore Ponti, in September of the following year, gave instructions to have further excavations made in different parts of the island. On this occasion twelve trenches were dug, covering an area of about 230 square yards, with an average depth of 3 to 4 feet.

The stratification and composition of the stuff were very similar to those experienced in the former excavations. In

this space four hundred and forty piles were counted, and Regazzoni calculates that at this rate the original number of piles requisite for the construction of the entire lake-village would be from thirty-five thousand to forty thousand. Some horizontal beams were also found among the *débris*. Among the relics the following are noteworthy:—A tyne of deer's horn, with a flint implement inserted into the end of it (No. 3); a small clay weight, shaped like a pear; several objects of worked bone, as needles (Nos. 7-9), pointers, chisels (No. 25), handles, etc. A knife (No. 5) and a dagger of bronze (No. 6), and two oblong beads of coloured glass with transverse grooves, were found in the stratum immediately below the surface soil.

As a rule, the tops of the piles in these trenches were on a level with the surface of the water, while those in the lake were several feet lower—more or less, according to the depth of the water. The cause of this was no doubt the protection given to the former by the accumulation of *débris* around them. It was observed that the uppermost layer alone had yielded Roman coins, but along with them were objects of both the Stone and Bronze Ages—a juxtaposition which might be accounted for by agricultural and other operations subsequently conducted on the island. The fourth, or that which lay immediately over the ancient lake-sediment, was alone deposited under water, as it contained some entire dishes, and the associated *débris* were just the usual contents of lake-dwelling relic-beds, viz., the shells of hazel-nuts, acorns, charred bits of wood, bones of various animals (among them being the skull of an enormous wild boar), as well as implements of bone, horn, and flint, pottery, etc. The second and third layers were composed of much the same materials as the fourth, but they appeared to have been the contents of a previously deposited relic-bed artificially heaped up, as they contained portions of wooden beams which had no definite purpose, but lay in the soil in all directions.

The relics of humanity collected on the Isola Virginia in the course of these various excavations are so numerous that one of the two rooms, set apart by Sig. Ponti as an archæological museum for the lacustrine remains of Lake Varese, is

entirely devoted to their exhibition and preservation, where they have been carefully and neatly arranged under the skilful care of Professor Regazzoni.

Pottery.—As in the other stations in this lake, there were two kinds of pottery met with—one black, and made of fine paste, of which most of the smaller vessels were made; the other was of a greyish colour, with sometimes a reddish tinge, and contained a mixture of fine gravel or coarse sand, which gives it a rough appearance. The fragments and entire dishes in the Ponti Museum decidedly testify to considerable skill in the ceramic art. Besides perforated knobs and tubular borings for the insertion of cords (No. 17), there are various forms of handles, as in Nos. 14 and 16, the latter of which is interesting, as it suggests the primary stage of the *ansa lunata*, which is such a prominent feature of the pottery in the eastern portion of the Po Valley.

The diversity of ornamentation is also worthy of notice—raised dots, nail-marks, perforated rims, lines, corrugated grooves and cord-markings, forming a variety of combinations (Nos. 13, 15, 22, 23, 26, and 27). One bit shows the impression of plaited reed-work (No. 29). Another, an entire dish made of fine black paste, consists of three cups united and having a communication with each other by a small hole in the dividing septa (No. 24). The coarse pottery indicates vessels of large dimensions. There are also loom-weights, spindle-whorls (No. 21), some conical objects pierced vertically (No. 10), and casts of wickerwork, supposed to be the remains of the cottage walls.

Bone and Horn.—Objects of bone and horn are numerous, such as polished daggers, pointers, chisels (No. 25), needles (Nos. 7-9); also a few perforated teeth.

Stone.—Celts and chisels are fairly abundant, and among them are one or two of jade. Though I noted only one fragment of a perforated axe-head, the art of boring stone was known and skilfully practised, as there are several spindle-whorls and other implements with neat perforations (No. 18). There are also hammer-stones (some with finger marks), corn-grinders, and polishers. Among the latter are large flat polishing slabs, and a few hand-polishers made like a stone celt (No. 11), which are



Isola Virginia. (No. 25 = $\frac{1}{4}$, and the rest = $\frac{1}{2}$ real size.)



peculiar to North Italy, if not, indeed, to the Varese lake-dwellers, as I have seen only one other out of the district, viz., at Viadana.

Among the flint objects are knives, scrapers, saws, arrow-points, chisels, cores, and a large quantity of flakes (Nos. 1-3). For small cutting implements flint was not the only substance used by these lake-dwellers, as there are thirty-six fine flakes of obsidian (No. 4), and some arrow-heads of rock-crystal.

Bronze.—The bronze objects in the museum, including fragments, amount only to fifteen, and represent knives, fish-hooks, etc. (Nos. 5, 6, and 12).

Amber.—There is also a bit of amber which appears to have been an ornament.

Small square or oblong pieces of wood, perforated (No. 20), are supposed to have been floats for nets.

The organic remains collected in the fourth stratum, which was considered to be the true relic-bed of the palafitte, were submitted to Professor Sordelli, who recognised, among other seeds and fruits, the following:—Millet (*Panicum miliaceum*), wheat (*Trit. vulgare*), bramble (*R. fruticosus*), and the vine (*Vitis vinifera*).

Among the bones of animals identified were those of the bear, wolf, badger, beaver, wild boar, stag, roe, etc. The ordinary domestic animals were represented, and in addition to them, portions of two human jaws, found a few inches below the tops of the piles. (Literature—B. 109, 112, 115 (*bis*), 117 (*a*), 123 (*a*), and 143.)

Professor Castelfranco (B. 148), who has carefully studied the phenomena presented by these repeated excavations, formulated the following theory as to the succession of events which have brought about the evolution, so to speak, of the Isola Virginia:—

(1) The original palafitte had been destroyed by a conflagration towards the close of the Bronze Age, or at the beginning of the Iron Age.

(2) Its inhabitants were hunters, fishers, rearers of domestic animals, and agriculturists.

(3) Shortly after the destruction of the pile-village, its

subsequent occupiers converted the larger portion of its site—which had already, in parts at least, reached the surface by the gradual accumulation of *débris*—into a veritable island, by heaping over it stuff dug from the margin and especially from the landward site, where there is now a channel separating the island from the mainland. Thus the upper layers contain the *débris* of the earlier people, mixed with sand, gravel, and mud. This view is rendered probable by the fact that in one place, towards the north of the island, the second layer was displaced by an artificially constructed bed of large pebbles.

(4) The new-comers, to whom Castelfranco assigns the transformation of the palafitte into an island, were the Ligurians, whose “sepultures a cinération” are so numerous found in the neighbourhood.

Since these early investigations no systematic excavations have been made on the Isola Virginia; but occasional discoveries of antiquarian objects have been recorded, all of which have gone to enhance the value of the lake-dwelling collections in the Ponti Museum. Of these incidental discoveries there is one “find” which merits special notice. In October 1904, Professor Castelfranco, while digging a trench south-west of the museum, turned out, from a depth of 0.50 metre, a well-finished flint dagger of the olive-leaf shape, and, only 10 centimetres lower, he came upon five metallic celts of the flat type. They were embedded within a space of not more than a square metre, and had a uniform appearance both as regards size and form. Two of them are here figured (Pl. XLV., Nos. 31 and 32) from Castelfranco’s report of the discovery (B. 195 (a)). On being analysed their composition was found to be as follows :—

| | | | | | | |
|-----------------|---|---|---|---|---|--------------|
| Copper | . | . | . | . | . | 97.23 |
| Silver | . | . | . | . | . | 0.59 |
| Tin, lead, etc. | . | . | . | . | . | 2.18 |
| | | | | | | <hr/> 100.00 |

Bodio.—The bay opposite the village contains the remains of three stations, the most southerly of which is known as “Keller,” or “Del Gaggio”; the next as “Bodio



Bodio, Cazzago, and Bardello. (Nos. 24, 31, 39, 43, and 44 = $\frac{1}{4}$, and the rest = $\frac{1}{2}$ real size.)

Centrale," or "Delle Monete"; and the third as "Desor," or "Del Moresco." All these are comparatively near the shore, being only about 30 yards distant, and the central one is about equidistant—some 800 yards—from the other two (B. 112, p. 47). The central station appears to have been a true *steinberg*, as its area was covered with stones; regarding which Stoppani remarks that formerly they were more numerous, because within recent times some were known to have been removed for building purposes. At first more bronze objects were found on Keller, and more pottery on Desor, while the Centrale was characterised by the discovery on it of a hoard of Roman coins. Subsequent investigations have not borne out these early distinctions based on the character of their relics, and they are now generally acknowledged to belong to the same age.

The coins found on the Centrale were mostly small silver pieces, much decomposed, belonging to the last half-century of the Republic. Stoppani collected about seventy, and Angelucci, who explored shortly after him, no less than one hundred and twenty-eight. One found by Regazzoni in 1876 (B. 112, p. 52) has on it, along with the head of Mark Antony, the following legend: "M. ANT. IMP. AUG. III. VIR. R.P.C. M. BARBAT. Q.P.," which would make the date about 40 B.C. The hoard is supposed to have been lost or deposited here long after the lake-dwelling ceased to be inhabited—a supposition that is borne out by the fact that the coins were confined to one limited spot only a couple of yards square. In 1876-7 Sig. Ponti made researches on Desor which greatly enriched his museum, both in stone and bronze objects. A selection of objects from these stations is given on Plate XLIII.

Cazzago-Brabbia.—This station is situated opposite the village of the same name, and at first it gave such poor results that Stoppani called it a trial station, or an attempt to found a settlement. From the researches made in 1877 it was found to be rich in remains exactly similar to those at Bodio. It was, however, farther from the shore, and extended parallel to it for about 150 yards. Its breadth was somewhat irregular, and, judging from the disposition of its piles, it

would appear to have been two quadrangularly shaped stations nearly in contact with each other. Among the bronze objects collected on this station are four lance-heads, a chisel, an awl, ten fish-hooks, four hairpins, a fibula, etc. There are also some fine arrow-points of flint (B. 148).

Bardello.—Near the mouth of the river are two stations, one on the left and the other on the right shore. The former, called Ranchet, after its discoverer, is a small settlement some 200 yards from the mouth of the river, and 6 or 7 from the shore. It measures about 60 yards long and 50 broad. A large quantity of the bones of domestic animals was found here, as well as some flint and bone arrow-points, spindle-whorls, and various fragments of pottery. Ranchet records also a small lance-head of bronze, a portion of a vase containing some black stuff adhering to it (supposed to be remains of food), and portions of another of fine black paste. The station on the north shore, called after Professor Stoppani, is about 100 yards from the mouth of the Bardello, in the direction of Gavirate. It is in the form of a parallelogram, 65 by 45 yards, and, like the previous station, has the piles arranged in parallel rows. Among its relics are bones of the ox, goat, stag, and pig; flint arrow-heads, scrapers, etc., of the usual kind; some bone implements. Two bronze pins and a winged celt (Nos. 23 and 44) are sufficient to show that the station was similar to the others in Lake Varese.

Marinoni (B. 55) mentions another station opposite Gavirate, but neither Regazzoni nor Ranchet could find any traces of it (B. 112, p. 66).

Torbiera di Biandrono.—Lake Biandrono, which formerly occupied a larger area than at present, has on its north-west side an extensive peat-bog, in which Dr Quaglia has discovered the remains of a true palafitte lying under a deposit of about 6 feet of moss. The station, some 200 yards distant from the lake, is of a quadrangular shape, with massive piles scattered over its area. It is remarkable as having supplied objects which might be considered characteristic of any period, from the earliest polished Stone Age down to that in which knives, spears, hooks, and spurs of iron were manufactured (B. 112, p. 89). Other objects from Palude Brabbia are



Torbiera di Cazzago-Brabbia (except No. 1).
(Nos. 18 and 35 = $\frac{1}{3}$, 32 = $\frac{1}{4}$, and all the rest = $\frac{1}{2}$ real size.)

polished stone hatchets; arrow and lance-heads of yellow and dark flint; some fragments of pottery made of fine paste by the aid of the potter's wheel, and of extremely elegant forms (B. 138 (*bis*), p. 80); two fish-hooks of bone and two oars, now in the museum at Varese. Four curious objects, similar to one from Torbiera di Cazzago-Brabbia (Pl. XLIV., No. 18), were found on Bardello station (B. 112, p. 87). These relics have been widely dispersed, having gone to the museums of Pavia, Milan, Varese, and Como. An iron spur figured by Regazzoni is in the Como Museum.

Torbiera di Cazzago-Brabbia.—Some forty years ago the peasants commenced to cut peats in the extensive turbary which lies on both sides of the canal Brabbia, and it is recorded that objects of antiquity were from time to time found, to which, however, little attention was paid. As early as 1856 Angelo Quaglia directed attention to worked beams in the peat, and since 1863, when such objects began to be more inquired after, other piles were detected in one or two places. The most important of these stations is near the mouth of the Brabbia, on its east bank. Here, during the last few years, many interesting relics have been found. While the usual flint and stone objects (Pl. XLIV., Nos. 2-8) are abundant, others of a more novel character have to be added to the list. Especially noteworthy are some peculiarly shaped fibulæ (Nos. 9-15), one being of iron (No. 12). A curious object made of bronze rings (No. 18), supposed to be an epaulette, is also from this station. Other objects of bronze are some hairpins (Nos. 22-28), an ornamental pendant (No. 17), a winged celt (No. 21), and a ring (No. 19). There is also one flat celt of copper (No. 20). Among the stone celts and chisels some are now recognised to be of jade and chloromelanite (No. 33). There were also spindle-whorls of terracotta (No. 29) and a quantity of pottery (Nos. 34 and 35); also two small pendants of amber. Of stag-horn there are two magnificent harpoons, one of which is here figured (No. 32). Square bits of wood with central perforations (No. 36) are supposed to have been used as floats for fishing-nets. Among the osseous remains is the skull of a deer with part of the horns attached.

Quaglia figures a number of objects from the turbaries of Lombardy (B. 138 (*bis*)). A curious flat stone like a wheel, with a wide circular perforation and a sharp outer edge, comes from Palude Brabbia (Pl. XLV., No. 24). A large harpoon of deer-horn (No. 23) and a finely polished celt of serpentine (No. 25) are also from the same place.

Pustenga.—Between Galliate and Doverio, and not very far from the south shore of Lake Varese, there exists in the plain called “Pustenga” a turbary of some 17 acres in extent, which was formerly a small lake, and in which G. Quaglia (B. 138 (*bis*), p. 9) has detected the remains of a palafitte. Among the objects recorded from this station are two arrow-points, a knife, and a saw of flint, six stone celts, and a large jaw of an ox. Of the stone hatchets four are of serpentine, one of jadeite (Pl. XLV., No. 20) and one of chloromelanite (No. 21).

Lake Monate.

In the month of April 1863, Stoppani, Desor, and De Mortillet searched this lake unsuccessfully, and consequently came to the conclusion that it was unsuitable for lake-dwellings (“non potesse offrire spiaggia opportuna per le palafitte.”). Notwithstanding this opinion, the Abate Ranchet, with the assistance of two local fishermen, succeeded shortly afterwards in discovering the sites of two settlements on the east shore of the lake (B. 55), near the village of Cadrezzate. The stations were in water from 6 to 9 feet deep, and about 200 yards apart, and their sites were marked by large mounds of stones (“enormi cumuli di grossi ciottoli”). Fragments of pottery were found in abundance, which in quality of paste and form corresponded with those of the palafittes in Lake Varese. One dish had also a quantity of black stuff, which was supposed to have been the remains of some kind of porridge. A saw, two arrow-points, and a few chips of flint and bits of charcoal, were the only objects, in addition to the pottery collected.

Little was done by way of exploring these stations till the year 1875, when the brothers Borghi, the proprietors of the lake, became interested in its submerged antiquities, and



Objects from various Turbaries. Bosio, 1-8, 10, 11; Capriano, 13, 15-19; Brenno, 14; Cascina, 9, 12; Pal. Brabbia, 23-25; Pustenga, 20, 21; Mongenet, 28; Bolengo, 29; Trana, 30; Mercurago, 27; Varese, 22, 26, 31, 32. (Nos. 9, 12, 22, 31 = $\frac{1}{2}$; the rest = $\frac{1}{2}$.)

[To face p. 358.]



proposed to make further researches. To the experienced archæologist Castelfranco they entrusted the conduct of these researches, and it is to his report (B. 107) I am indebted for the following facts.

Sabione.—The most northerly and largest of the two stations at Cadrezzate is about sixty yards from the shore, and occupies a quadrangular space of about 100 yards in length, and rather more than the half of this in breadth. This area was overspread with stony mounds with clear spaces of from two to four yards between them. and for this reason it was difficult to operate with the drag. Piles were found in the intervals between as well as on these steinbergs; but Castelfranco thinks the former were the roadways between the huts, which were built on the piles supported by the stones.

The relics collected were similar to those of Varese, of which the following are the principal objects:—

A bronze hatchet (*coltello-ascia*), 5 inches long, and 1 to $2\frac{1}{4}$ inches broad. Pottery, including fragments with handles of various forms.

Several dishes containing a black crust, “simile al residuo che la polenta lascia in fondo al painolo dopo la cottura.” Some of this stuff was submitted to Professor Sordelli for analysis, and he thinks, from detecting in it the halves of acorns, that it was a kind of porridge made from this fruit. One thin spindle-whorl, 2 inches in diameter, had a few punctured dots on its surface, intended as an ornamentation. One flint arrow-point, and a stone hatchet, converted into a polisher, like those already described from Varese. There were also shells of hazel-nuts, and kernels of the cornel-cherry.

Pozzolo.—This station was similar to the former, but only about half its size. The principal relics from it were:—

Of bronze there were a triangularly shaped spear-head, or dagger, $3\frac{1}{4}$ inches long and an inch broad at its base, and containing two rivet-holes; a hairpin, $3\frac{1}{2}$ inches long, with a ring head; and a fish-hook.

Among stone objects were a few arrow-points, and a chisel of dark flint; a hammer and polisher of the hatchet-shaped kind.

Fragments of a coarse and fine pottery. Vases containing a kind of polenta like that already noticed. One bone was found, and in one spot there was a large quantity of cherry-stones.

Occhio.—The “Stazione dell’ Occhio” is near Monate, and consists of a mass of stones in water from 10 to 14 feet deep; but, notwithstanding the difficulty of searching in such a depth, the following industrial remains were collected:—Chips of flint, charcoal, fragments of pottery, shells of hazel nuts, and a bronze hook—sufficient to show that it belonged to the same period as the others.

Lake Varano.

The previous failure of the early explorers and, subsequently, of the experienced fishermen known as “Lo Spariss,” in their search for palafittes in Lake Varano did not prevent Castelfranco from trying his luck in this lake also. In July 1878, with the assistance of two fishermen, he made a tour of the lake (some 5 miles in circumference), and discovered traces of no less than eight stations in different localities, chiefly on the east shore. But the objects, though sufficiently distinctive to show their origin, are too few and unimportant to require any detailed notice.

Professor Castelfranco came to the conclusion that in both the lakes of Monate and Varano the palafittes were coeval with those in Lake Varese. He was, however, struck with the entire absence of bones in both of them—a fact which appeared to him unaccountable (B. 107).

Torbiera di Mombello.

Between the villages of Mombello and Cerro, on the east shore of Lake Maggiore, and a few miles south of Laveno, there was a small turbary in which Dr Carlo Tinelli discovered the remains of a palafitte. Excavation of the peat began in 1844, but it was twenty years later before the remains of the palafitte were detected. The further progress of the peat-cutting was carefully watched by Tinelli and a priest, Guiseppe Della Chiesa, in the interests of archæology. Some of the piles

were extracted, and were said to show marks of having been fashioned by stone implements.

The relics collected here were :—Flint objects in considerable abundance, among which were two saws, a lance-head, and a beautiful knife-flake (Pl. XLIV., No. 1), now in the museum at Varese; fragments of coarsely made dishes, without handles or ornamentation. Three canoes, roughly made and similar to those from Mercurago, were found at a depth of 8 feet. One of the canoes, 7 feet long, was presented to the museum at Varese. Along with these objects were bones of the stag, goat, and roe (B. 61).

Torbiera di Valcuvia.

In 1870 Professor Leopoldi Maggi described the remains of a palafitte found in “un bacino torboso” between Santa Maria di Cuveglio and Cavona (B. 64). This basin lies among glacial débris and was formerly a small lake, but in modern times it became entirely filled up with peat. On the surface there was a layer of vegetable soil 10 inches thick, then spongy peat to the depth of 3 feet, and then a layer of more solid peat about 1 foot 8 inches thick. Underneath these layers was a blackish muddy deposit, extending to an unknown depth, into which the piles were inserted. These piles were from 5 to 10 feet long, and 8 to 10 inches in diameter. They were closely set, and along with them were several beams lying horizontally. The relics consisted of pottery, knives (said to be of bronze and iron), charcoal, etc., all of which were dispersed.

Torbiera di Brenno.

Another locality that has yielded interesting remains of “stazioni palustri” is the “torbiera di Brenno-Useria,” situated along the road from Varese to Porte Ceresio, on Lake Lugano. Here, some years ago, a canoe was dug out by the peat-cutters, and associated with it were a large number of weapons of bronze and iron, bracelets, fibulæ (Pl. XLV., No. 14), bones of domestic animals and of man, but no objects of flint (B. 112, p. 92).

Lake of Lecco.

As early as 1860 Desor thought he had discovered indications of a palafitte in Lake Maggiore (*Atti della Soc. It. di Sc. Nat.*, vol. ii.), but this was subsequently disproved, and up to the present time no remains of these ancient dwellings have been found in this lake. The explanation of their absence in the larger lakes of Italy is to be found in the physical conditions of these glacial and rock-cut basins, which, owing to the depth of water and their rapidly shelving shores, afford no holding for piles.

Stoppani in his first exploratory tour turned his attention to Lago di Lecco, and, having found a group of piles between the Bridge of Lecco and Malgrate stretching towards the western shore, he concluded this was "una bella palafitta a cui nulla mancherebbe per ritrarre perfettamente quelle della età del bronzo." The only resemblance of this supposed palafitte to those of the Bronze Age was the fact that the tops of the piles projected 1 or 2 feet above the lake mud, as no relics of any kind were found. Further researches have not confirmed Stoppani's opinion, and Regazzoni throws out the hint that the piles observed by him might be the work of modern fishermen, who are in the habit of inserting stakes for fixing their nets, and which, among themselves, go under the name of *serrade*, or *gueglie* (B. 14 and 112, p. 70).

Lake of Annone.

In the narrow strait which connects the small lake-basins of Sale and Annone, Stoppani found some piles projecting from a heap of stones in a depth of 6 or 7 feet of water, which he took to be indications of a palafitte. In 1877 Castelfranco (B. 102) re-examined the locality, and came to the conclusion that the submerged piles and stones observed by Stoppani were merely the remains of a bridge which, at some former period, connected the peninsula Isella with the southern shore; and so the matter still rests.

Lake of Pusiano.

More satisfactory discoveries were, however, made by Stoppani in Lake Pusiano, where, at the north end of the

Isola dei Cipressi, he recognised the existence of a pile-dwelling. The genuineness of this station has been confirmed both by Castelfranco and Regazzoni, who had subsequently made some investigations in the locality. The industrial remains were confined to a few objects of flint—saws, scrapers, flakes, and arrow-points, a portion of a terracotta whorl, and some bones and teeth of animals. In 1877 Regazzoni found piles at the other end of the Isola dei Cipressi, buried in a heap of stones (B. 112, p. 72).

Torbiera di Bosisio.

To the east of Lake Pusiano lies the torbiera di Bosisio, which came early under the notice of archæologists by the discovery in it, at a depth of 10 feet, of a beautiful bronze axe-head (Pl. XLV., No. 10). Since then a great many relics have been, from time to time, found in this turbary, but they have been dispersed, and as the deposit is now nearly exhausted no more finds can be looked for. Sig. G. B. Villa (B. 29), in his descriptive notices of this peat-moor, speaks of arrow-points, burnt wood, bits of straw, trunks of trees, etc. Among other things which have been sent to different museums are a bronze spoon (No. 11) (probably of much later date than the other objects), some beautiful arrow-points (Nos. 1-7), and a lance-head of flint (No. 8). An iron hook of modern shape was found at a depth of 3 feet (B. 112, p. 97).

Torbiera di Capriano.

In 1869 Dr Marinoni described a turbary at Capriano, near Renate (B. 60), in which some remarkable objects of bronze were found at a depth of about 7 feet. Similar objects are common among the relics from the Swiss lake-dwellings, and, judging from what we know of the early Iron Age in Italy, they appear to belong to this period. The find comprised a hairpin (Pl. XLV., No. 13), a fibula (No. 18), three bracelets (Nos. 15 and 16), a pendant (No. 17), and a spiral ring (No. 19), all of which are here reproduced from Marinoni's work.

Torbiera di Maggiolino.

Sig. G. B. Villa, in his "Notizie sulle Torbe della Brianza" (B. 29), describes another locality not far from Bosisio, in the

territory of Rogeno, called Maggiolino, in which piles, bones, fragments of pottery, flint knives, and arrow-points, etc., were found—evidently the usual débris of a palafitte (see also B. 112, p. 97).

Torbiera di Mercurago.

Since Gastaldi published his first report on the discovery of palafittes in the bog of Mercurago by Professor Moro, many additional objects from this locality have come to light, some of which have been noticed and figured by Gastaldi in his numerous articles on the antiquities of Lombardy. The peat is now exhausted, but from these notices, together with an inspection of the relics still preserved in the Turin Museum, we can have a tolerably correct notion of this the first discovered lake-dwelling in Italy. (Literature—B. 4, 7, 30, 59, and 97.)

The peat-basin of Mercurago is of an oblong shape, and the antiquities and piles were in a circumscribed place at its northern end, about 130 feet from the bank. Here in a space of 30 feet square, cleared for antiquarian purposes, were counted twenty-

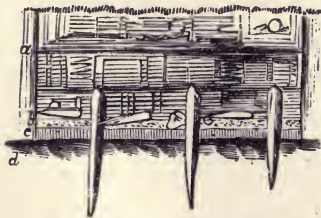


FIG. 159.—Section of a Portion of the Pile-structure in Mercurago, showing Piles and Transverse Beams.

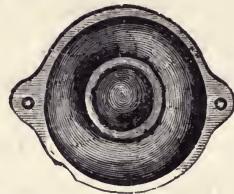
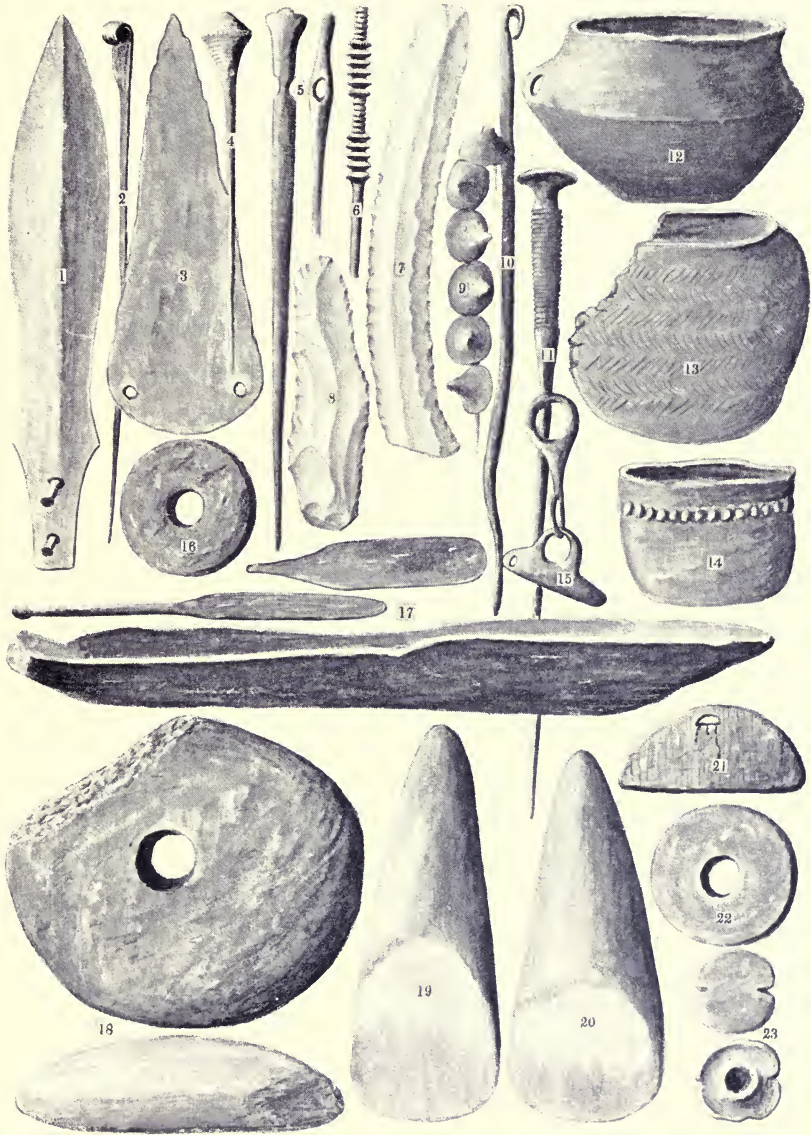


FIG. 160.—Cover of an Earthen Vessel ($\frac{1}{2}$).

two piles bound together with cross-timbers (Fig. 159). The deposit of peat was about 6 feet in thickness, and the tops of the piles reached half-way upwards, while their lower ends penetrated from 3 to 4 feet into the lake mud beneath. Between this mud and the superincumbent peat there was a bed of fern, and lying immediately over it were the following relics—three earthen dishes in good preservation, one of which appears to be a lid or cover for another dish (Fig. 160), together with a large quantity of the broken fragments of others; a bronze pin (Pl. XLVI., No. 6), a scraper $4\frac{3}{4}$ inches long (No. 7);



Mercurago and other Turbaries in Lombardy.

Mercurago, 1-9, 12, 13, 18, 22; Borgo-Ticino, 19; and San Martino.

(Nos. 12, 14, 18, 21, 23 = $\frac{1}{4}$; 13 = $\frac{1}{6}$; 17 = $\frac{1}{2}$ (the paddles $\frac{1}{10}$); and the rest = $\frac{1}{2}$ real size.)



several arrow-heads, and quite a litter of flint flakes; some shells of hazel-nuts, and stones of the cornel-cherry, etc.

The pottery was made of a blackish paste mixed with coarse grains of sand or quartz, and a few dishes were ornamented with patterns of zigzag scratches separated by parallel lines (No. 13). Some had handles, and others small ears or perforated knobs, two of which had portions of string still attached to them (Fig. 161).



FIG. 161.—An Earthenware Vessel, with bits of Cord attached to the Handles.

Among other relics from this station were:—Two daggers of bronze, one still retaining a couple of rivets for fixing the handle (Pl. XLVI., No. 1); two bronze pins (Nos. 2 and 4); a wooden anchor $3\frac{1}{4}$ feet long, terminating at one end with two hooks and at the other with a hole, as if for attaching a rope; a canoe, 6 feet long, $3\frac{1}{4}$ feet wide, and about a foot in depth (Fig.



FIG. 162.—Portion of a Canoe.

162); near the canoe lay a bronze drill (Pl. XLVI., No. 5); and a neat spindle-whorl of baked clay, $1\frac{1}{2}$ inches in diameter (No. 22). Among the more recent finds are numerous flint arrow-heads and scrapers (No. 8); a spindle-whorl of soapstone (*pietra ollare*) (No. 16); a wooden dish and perforated floats for nets; earthenware dishes of great variety (No. 12); and

sixteen conical beads of vitreous paste, which, when strung together, formed a handsome necklace (No. 9), and a large cake of burnt clay perforated in the middle (No. 18).

But the most remarkable objects were two wooden wheels.

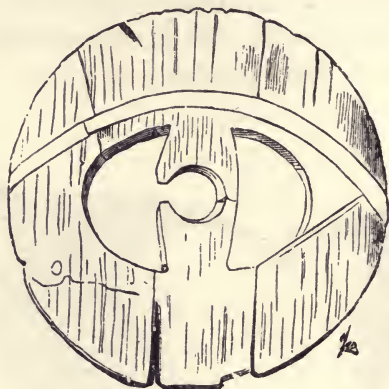


FIG. 163.—A Wooden Wheel from Mercurago.

One (Fig. 163) was made of three boards kept together with two cross-bars dovetailed into the boards, and in the centre was a round hole having on each side of it a semilunar space. This wheel, which was not quite circular, had an average diameter of

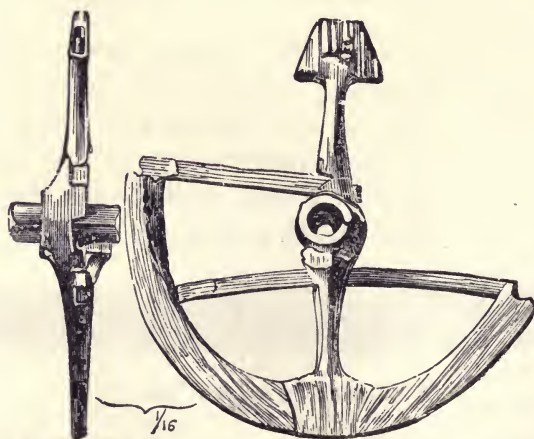


FIG. 164.—Two views of another Wooden Wheel from Mercurago.

2 feet. The other wheel (Fig. 164) was differently constructed. It had six spokes; two of them were made of the same piece of wood as the nave, and their extremities formed part of the rim; the other four, two on each side, connected the felloes with the

central piece. The fellies were neatly mortised together, and the workmanship was very good. These wheels were so far decayed that they could not be preserved, but casts of them were taken, which may now be seen in the museum at Turin.

Torbiera di Borgo-Ticino, etc.

Analogous remains to those in Mercurago have been found in several other localities, especially in the districts called Pennino, near Borgo-Ticino, and the moor of Gagnano; but the objects were dispersed or thrown away. A stone celt from this place figured by Gastaldi is here reproduced (Pl. XLVI., No. 19).

In the neighbouring moor of Conturabia a group of piles was observed in the centre of the bog which appears to have belonged to a palafitte of a later date, as some of the piles were said to have been tipped with iron. Gastaldi procured one of these piles, and although this particular one had no iron on it, he was convinced that it had been sharpened by instruments similar to those in use at the present day (B. 7).

Torbiera di San Martino (San Giovanni del Bosco).

This morainic basin is situated in the vicinity of Ivrea, immediately to the south of the village of Giovanni, and it also has yielded, from time to time, antiquities which leave no doubt that it was a home of the lake-dwellers. The bog is of an oval shape, about $1\frac{1}{4}$ miles in length, and half this in breadth, and is beautifully situated amidst groves of chestnut and walnut trees interspersed through rich meadows and fields. On its margin are found the trunks of trees, from 1 to 2 feet in diameter, still attached to their roots, and lying just as they had fallen, with their points directed to the centre of the bog. These trees are generally pine, oak, hazel, alder, etc.

Below the ordinary peat there is a layer of blackish mud, which, on being dried, is combustible, and underneath it lie the stratified layers of ancient lake silt, consisting of a whitish clayey substance. In the blackish intermediate layer there was found, in September 1864, a canoe 8 feet 4 inches long, 1 foot $9\frac{1}{2}$ inches broad, and 8 inches deep. (A model of this canoe

is now in the museum at Turin.) A few years later (1868) another canoe was found in this turbary, of slightly larger dimensions, having two paddles in it (Pl. XLVI., No. 17). The following objects are, among others, described and figured by Gastaldi (B. 59 and 97) as coming from the same place, viz. :—Specimens of pottery (Nos. 14 and 23), one of which (No. 23) is a lid of a vessel precisely similar to the one from Mercurago (Fig. 160); flint and stone implements (No. 20); wooden net-floats (No. 21); two bronze pins (Nos. 10 and 11); and a remarkable bronze pendant (No. 15), supposed, however, to be of Etruscan or Roman origin, and of later date than the other remains.

Other turbaries in the western districts of the Po have yielded prehistoric remains, but associated with them there were no piles or other indications of lake-dwellings :—

Torb. di Torre Bairo.—Fragments of vessels made on the wheel. In another small bog a quern-stone was found which is supposed to be of Roman times.

Torb. di Mongenet.—A bronze paalstab (Pl. XLV., No. 28).

Torb. di Bolengo.—A bronze arrow-point (Pl. XLV., No. 29).

Torb. di Trana.—A sword of bronze 27 inches long (Pl. XLV., No. 30), and a celt of the flat type.

Lagozza.

Lagozza is the name given to a small “bacino torbosa,” situated in an undulating plateau of morainic débris, about 4 miles from Gallarate, in the province of Milan. It is roughly oval in shape, and covers a superficial area of 10 or 12 acres. Till recently this basin was a peaty bog, passable in summer (with certain precautions) to “Cacciatori”; but in former times, as its name implies, it was a stagnant lake. In 1875 the proprietor, Count Cornaggio, an ardent and skilful agriculturist, determined to remove the peat altogether, and, for this purpose commenced operations by cutting a central canal to carry off the water. While the workmen were thus engaged they began to find near the middle of the bog bits of pottery, charcoal, and rotten piles, which, on skilled attention being directed to them, turned out to be undoubted remains of a prehistoric lake-

dwelling. The process of clearing out the peat was therefore watched with great interest by local antiquaries, as the operation would involve a more thorough investigation of the antiquities embedded in it than any researches that were likely to be undertaken from a scientific point of view. It was not till the spring of 1880 that the main portion of the palafitte was reached by the peat-cutters, and then various antiquarian objects were met with. The turf is now entirely removed, and the relics collected are deposited partly in the Museo Civico in Milan, and partly in the Museo Archeologico at Como.

The pile-dwelling occupied a rectangular space, near the centre of the basin, about 80 yards long from north to south, and 30 to 40 yards broad. The turf here varied in thickness from 1 to 2 yards, according to the state of moisture, below which there was a muddy stratum containing the roots of water-plants (*fango con radice*), among which the tops of the piles appeared. This layer was 16 inches thick, and immediately below it was the *strato archeologico*, which varied in thickness from 2 to 8 inches, and contained the usual débris of human occupancy in a matrix of black peat, mud, and earth. Below this again was a stratum of black earth, mixed with the whitish clay or marl of the ancient lake bottom, in which the points of the piles were firmly fixed. The piles were pointed at the base and irregularly fixed, four or five to the square yard, and varied in length from $3\frac{1}{2}$ to 5 feet, with a diameter of 4 to 8 inches. Many prepared beams, either of round or split stems, some over 20 feet in length, lay buried in the peat, as if they had fallen from a platform. Regazzoni draws attention to some short beams having a square-cut hole at each end. One of these beams measured $24\frac{1}{2}$ inches long, $4\frac{3}{4}$ broad, and $3\frac{1}{2}$ thick, and the holes were $2\frac{3}{4}$ by $1\frac{1}{2}$ inches. The top of a tree whose branches were neatly chopped off at the distance of 6 or 7 inches from the stem was supposed to have been used as a ladder.

Castelfranco thinks the points of the piles were fashioned by some sharp-cutting instrument of metal, as some of the cuts were 11 inches long, and such as no stone weapon could have produced ("non credo che una scure di pietra sia mai stata capace di tanto"). This observation is very significant in face

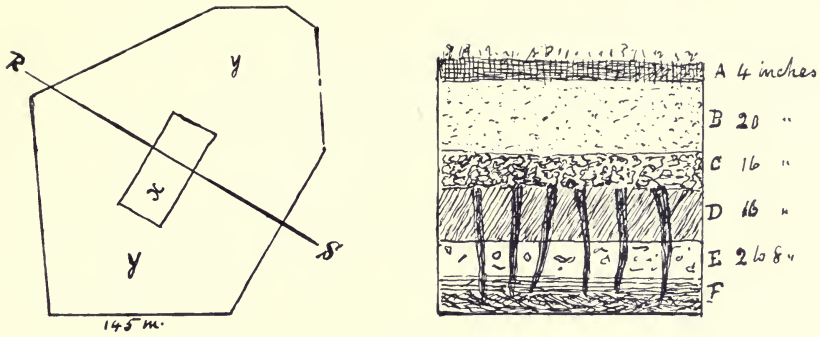
of the fact that there is no object of metal among the relics from Lagozza, with the exception of a fibula (Pl. XLVII., No. 18) found in the lower part of the turf, and therefore outside the well-defined relic-bed. This fibula belongs to the early Iron Age, and it is doubtful whether it belonged to the inhabitants of the palafitte. The same author also states that where charcoal and partially burnt wood were in greater abundance, there also the relics were more numerous; and hence he concludes that the settlement came to an end by a conflagration.

Among the industrial remains collected from Lagozza, pottery takes the chief place. The quality is of two kinds, coarse and fine, the latter having a smooth black appearance and without any admixture of coarse sand. The vessels, of which a considerable number are whole or nearly so, consist of cups, bowls, plates, vases, spoons, etc. They are generally without handles, having instead perforated knobs, as may be seen from the accompanying illustrations (Pl. XLVIII., Nos. 2, 6, 7, 9, and 15). The plates are sometimes ornamented with panels containing impressions of circles, dots, and lines (Nos. 3, 10, and 13). Some of the larger dishes have conical protuberances or finger-marks round the margin (Nos. 1 and 4). Among stone objects may be noted a number of white quartz pebbles, and eight or nine small polished stones with scratched markings on them (Nos. 11 and 12).

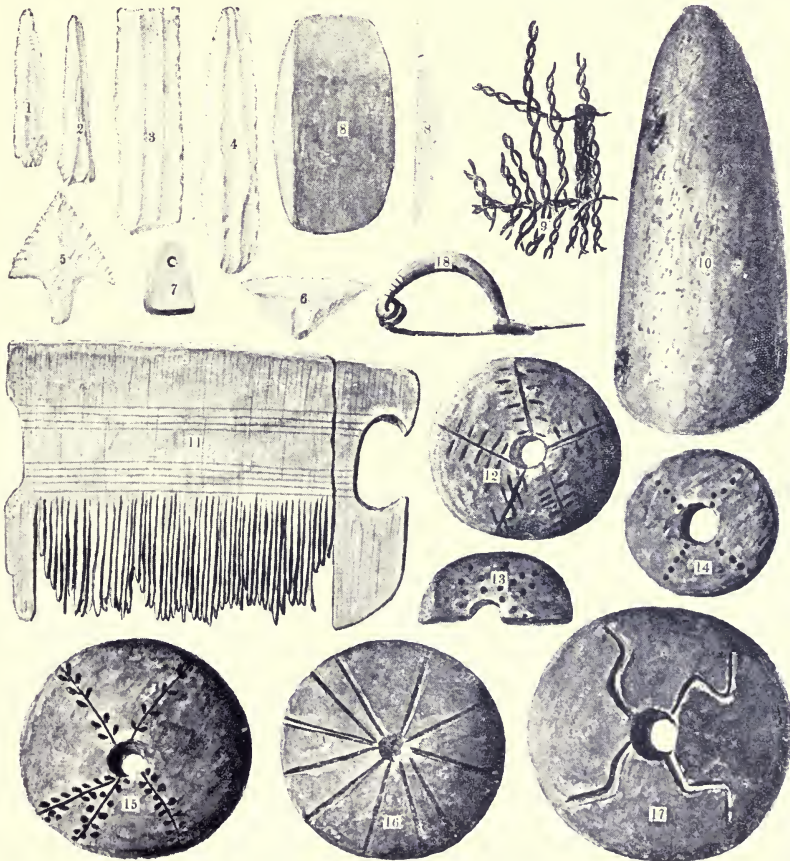
There are some clay weights of the usual conical shape, and others kidney-shaped with a perforation at each end (No. 14). In some of these weights bits of straw and grains of barley and wheat have been detected. The spindle-whorls, about forty of which are in the museum at Como, are somewhat peculiar, being flat circular cakes of burnt clay with a hole in the centre, and often ornamented with lines or rows of elliptical impressions (Pl. XLVII., Nos. 12-17).

Among the relics there is not a single article made of bone or horn, nor any trace of fishing or hunting gear, with the exception of one or two arrow-heads (Nos. 5 and 6).

Stone celts are scarce, only about thirty in all (No. 10), and none perforated. One small implement is a double-edged axe, *i.e.* one adapted for cutting at both ends (No. 8).



A.—Plan and Section.



B.—Relics. (All $\frac{1}{2}$ real size.)

Lagozza.



Flint flakes or knives (Nos. 1 to 4) are numerous, but cores and chips are less frequent. Arrow-points are extremely few. Only three were to be seen in the museum at Como, but their authenticity seems to be questioned by Castelfranco, who thinks they were not actually from the relic-bed in the palafitte.

A wooden comb (No. 11), with teeth at one side, is, I believe, the only specimen made of this material from any of the lake-dwellings in Italy.

Ornaments or charms are represented by one small pendant of green steatite, perforated for suspension (No. 7).

As evidence that the inhabitants were in the habit of spinning and weaving, there are, besides the spindle-whorls and clay weights, bits of thread and cord, and one small fragment of coarsely made linen tissue (No 9). According to Professor Sordelli, this was made from wild flax (*Linum angustifolium*), of which he found the seeds and fibres in abundance, but no trace of the cultivated species. On the other hand, there were two kinds of wheat and the six-eared barley. Among other food-remains were wild apples, acorns, hazel-nuts, stones of the cornel-cherry, poppy seeds, etc.

But the most remarkable feature of this settlement was that no animal bones of any description were found—not a tooth, or horn, or bone of any kind. Neither were there any warlike weapons, with the exception of the few doubtful arrow-points. For these reasons Castelfranco suggests that the inhabitants of Lagozza might have been vegetarians. (Literature—B. 119, 123 (*b*), 129 (*d* 2), 131, 135, 145, 148, and 151 (*d*).)

Lagazzi.

In 1890 the remains of what appear to have been a village of huts supported on piles were discovered in the bed of an ancient lake, now dried up, at a place called Lagazzi, near Vhò, in the province of Cremona. Here a series of trenches, executed under the superintendence of Sig. Francesco Orefici and Antonio Parazzi of Viadana, in a depression estimated at 250 metres in length by 150 metres in breadth, disclosed the following succession of strata (B. 161 (*c*)). (1) The surface soil, some 0.60 metre thick, in which remains of a few Roman tiles were met with. (2) An archæological stratum of a dark

colour mixed with charcoal, ashes, potsherds, worked objects of flint, wood, and bronze, etc. The surface of this bed presented a regular unevenness, forming as it were a series of low mounds. These on examination proved to be the débris of a series of huts constructed of timbers and clay. (3) Beneath the archæological stratum was a peaty deposit containing the stumps of the piles which had evidently supported the huts, but destitute of any other remains of occupation—thus proving that the peat had been deposited before the hut village had been erected. The bed of peat was about 1.50 metres thick, and rested on the original bed of the lake, some 9 metres from the surface of the field.

One of the trenches, 59 metres in length, showed, on section, eight groups of piles arranged at regular intervals, each group corresponding with the hut débris in the mounds above. Some of the piles were of oak about 15 cubic metres in diameter, and appear to have been roughly worked to a point and then hardened by fire. Parazzi supposes that the diameter of each hut could not be more than 5 or 6 metres, after allowing for a small passage between them. Some of the mounds showed three or four separate layers of hut débris, containing ashes, charcoal, broken bones, pottery, freshwater shells, worked objects of flint and deer-horn, together with burnt-clay casts of the timbers which formed the framework of the huts. The repetition of similar materials in each successive stratum suggests the destruction of the settlement on more than one occasion by fire. From Parazzi's description it is difficult to say whether this site should be classified as a lake-palafitte or a terramara.

Among the pottery were about fifty complete vases with one or two handles, roughly made, and burnt in an open fire, the rest being fragments of dishes of various forms. The commonest shapes were cups, bowls, the inverted and double cones. The handles, which rarely rose above the rim, were of various shapes, such as a ring or ribbon placed vertically (Pl. XLIX., Nos. 9 and 10); small protuberances either at the rim or on the body, and pierced with string-holes, sometimes vertically (No. 12) and sometimes laterally (Nos. 13 and 14). The handle known as *ad ascia* was common, but the



Lagozza. (All $\frac{1}{3}$ real size.)



characteristic crescent-shaped handle of the *terremare* was absent, as only one specimen (No. 15) resembling the *ansa cornuta* was found. One vase (a fragment) was pierced with twenty-six small holes, evidently adapted for straining purposes. Various methods of decorating vases are shown on two portions (Nos. 6 and 8). Objects of stone included fifty-eight pebbles (probably used as sling-stones), grinders, a pestle, polishers, two hammer-axes of nephrite, and several polished axes of amphibolite (No. 3). Among flint implements were a variety of arrow-points, knife-flakes, saws, borers, scrapers, cores, etc. Several objects made of stag-horn are perforated for the insertion of a handle (Nos. 1, 2, and 5), while others of horn or bone consist of awls, borers, daggers (No. 4), arrow-heads, needles, polishers, etc. Of bronze there were four needles (one only being perfect), and a small object pointed at one end, but rectangular on section for the rest of it. An amber conical button with a V-shaped perforation (No. 7) is of great interest, not only on account of the material but the wide distribution of this form during the early Bronze Age in Europe and Neolithic sites in Italy.

Portion of a large square carbonised beam was found lying immediately over the peaty deposit and covered over by the archæological stratum. A few piles were also observed in the latter, the points of which had not penetrated into the peat, suggesting that there had been a succession of upright piles corresponding to the number of hearths as shown in the mounds.

Among the osseous remains the following animals were represented:—dog, pig, wild boar, sheep, goat, two varieties of ox, stag, roe, water-tortoise, frog, and pike. Wheat (*Triticum aestivum sylvestre*) was also noted among a few other seeds.

La Torbiera d'Iseo.

Professor Castelfranco first directed attention to the discovery of objects of antiquity in the extensive peat-bog on the south of Lake Iseo, where for many years a company excavated the peat as a valuable local industry, by publishing (B. 151 (a), p. 145) a notice of a few remarkable objects

found in that locality, then in possession of Sig. Francesco Ruffoni. Subsequently Sig. Ruffoni himself gave a description (B. 161 (*e*)) of the more noteworthy relics in his collection. The antiquities were found from time to time by the peat-cutters, but the exact position of many of them was not determined, so that for chronological purposes they are of little value. Nevertheless, for comparison with the other relics found on the sites of the lake-dwellings and terramara settlements of North Italy, they are of exceptional interest. But neither piles nor any indications of the site of a palafitte have yet come to light.

The antiquities consist of a few fragments of coarse reddish pottery, worked objects of flint and bronze or copper, generally extracted from the line of separation between the marl, which formed the bottom of the original lake, and the more recent deposits of peat. An object of bronze described as part of a helmet, weighing 293 grammes, was found at a depth of 3 metres, near the central part of the peat-bog, and associated with a bronze sickle (Pl. XLIX., No. 16). A sickle very similar to it has been found in one of the palafittes in Lake Garda.

The knives (Nos. 17 and 18) were found in different parts of the peat. That with blade and handle in one is like one recorded as coming from a necropolis at Rovio (*B.P.*, 1, tav. iv.). One or two hairpins and a fragment of a fibula are also mentioned among the bronze objects. Four pendants of steatite, one of which is here figured (No. 31), are among the miscellaneous objects. Nos. 19 to 30 represent various forms of flint implements.

Polada.

About half-way between Desenzano sul Lago and the village of Lonato, and a little to the south of the direct railway between Milan and Venice, there is, in the midst of a series of morainic hillocks, a small bowl-shaped hollow, scarcely 300 yards in diameter, which at one time formed a stagnant lake called Polada. It appears that at some former period, of which there is now no record, this pool had been partially drained by means of a small tunnel which was pierced



Lagazzi (1-15), Torbiera d'Isco (16-31). (Nos. 1-18 = $\frac{1}{3}$, all the rest = $\frac{2}{3}$ natural size.)

through the morainic lip on its north side, and so carried off the water to a lower valley. The result of this was to expose a considerable portion of the lake-bottom, one part of which formed a tongue-like projection or promontory attached to its eastern margin. This continued to be the condition of Polada for many ages, and in the course of time the remaining portion of the lake became completely filled up with peat. Some years ago the proprietors of the bog commenced to utilise its contents as fuel, and, to facilitate this operation, the margin of the crater-like cavity was pierced by a second tunnel at a lower level than the former, so as to get rid of the water. It was then found that the promontory of land, which since its original exposure had been cultivated, had been only partially bared by the first drainage, as on its inner side there was a thin covering of peat, which a little farther on suddenly sank to a great depth. In the course of removing this covering of peat from the tip of the promontory, and just on the margin of the cultivated land, some rotten piles and other indications of a prehistoric dwelling were discovered. Dr Giovanni Rambotti, president of the Liceo Ginnasio at Desenzano, recognised this to be the remains of a lake-dwelling erected on piles, and so greatly did he interest himself in the objects recovered and daily turning up that he arranged with the workmen to preserve all relics for him. This discovery was made in 1872, and, as the operation of clearing out the peat progressed during the following two or three years, the settlement turned out to be very rich in industrial remains, and Dr Rambotti found himself the possessor of one of the most valuable and instructive collections of lake-dwellings in Italy.

From an inspection of the original outlet Dr Rambotti calculated that before the first tunnel was executed this tongue of land would be covered by 8 to 10 feet of water, and he thought that in this depth of water the lake-dwellers must have erected their piles and platform. That portion of the site had been exposed and destroyed when the first drainage was made, is probable; but at any rate sufficient remained to be able to form some opinion as to its size. When I visited the locality with Dr Rambotti he gave me

the following dimensions, which he derived from a careful study of the locality and disposition of the piles. Its form was that of an oblong parallelogram, 65 yards long and about one-third of this distance in breadth. Its longest diameter ran nearly east and west, and the dwelling thus presented its short side to the nearest shore. Two rows of piles, about 2 feet apart, stretched to the shore, a distance of about 100 yards, and Dr Rambotti justly concluded this to be the remains of the gangway. A shallow canoe, 25 feet long and 30 inches wide, having traces of fixtures for oars at three equidistant spots on each side, was found near the site of the lake-dwelling. Portions of a second canoe, apparently of smaller dimensions, were disinterred at the land end of the gangway.

But the most valuable feature of this lake-dwelling is the large and unique assortment of industrial remains which it has furnished, all of which were kept together at the private residence of Dr Rambotti.¹

Pottery.—The larger vessels were made of coarse greyish clay, mixed with rough sand or pebbles; but the smaller and more ornamental were composed of a fine black homogeneous paste. Besides a large quantity of fragments, there are in Rambotti's collection about one hundred and fifty vessels, more or less entire, showing a considerable variety of size and form, according to the uses for which the vessels were intended. Some were large, wide-mouthed jars, with two or sometimes four handles. The largest of this class measured 15 inches across the mouth and 9 inches in depth. One flat dish was 12 inches in diameter and only 4 deep, while another was flower-pot shaped, and measured 10 inches across at the top, $5\frac{1}{2}$ at the base, and 12 in depth. Another dish (Pl. LI., No. 37) was perforated all over with small round holes, arranged in upright and equidistant rows, of which there were in all thirty, each row having eight holes. The measurements of this curious percolator are $10\frac{1}{2}$ inches across the mouth, 8 at the base, and $4\frac{1}{2}$ in depth. Some vessels, especially the larger vases, were ornamented with a line of perforations or projecting knobs round the rim;

¹ The collection is now in the Museo Preistorico in Rome.



Polada. (All $\frac{1}{2}$ real size.)



others, again, had a ridge marked here and there with a knob round its bulging part (Pl. L., No. 6). Few were without handles. In one or two instances there was a hollow protuberance instead of a handle, sufficiently prominent to be grasped, and the hollow part communicated with the interior of the vessel. The handles were attached generally at the rim, but often below it, and sometimes half-way down the side of the vessel. The largest handle, I noticed, measured 6 inches from its two points of attachment. Some of the handles were surmounted by a button-shaped prominence (No. 10); others terminated in a bifurcation like a couple of horns, which strongly suggests a rudimentary form of the *ansa lunata*, so characteristic of the *terremare* (Nos. 13 and 14). Of the finer kind of pottery there are many forms of dishes, such as cups, bowls, plates, jugs, etc., some of them being ornamented with simple designs made with dots and lines (Nos. 9, 10, and 11). One handle had the form of a cross punctured on it, having one arm prolonged into a stem running downwards, just like a modern Christian cross.

A considerable number of perforated clay weights, of which five are flat, with the hole in the centre (Nos. 19 and 20). The most novel objects were a few oblong cakes of terracotta ornamented with repeating lines of small circular depressions (Pl. LI., Nos. 22-24). Also about one hundred and forty spindle-whorls of terracotta, some being variously ornamented (Nos. 28, 29, and 36).

Stone Objects.—A large sandstone polisher, together with a number of smaller ones. About forty hammer-stones of quartz, serpentine, etc., some having finger-depressions. A few perforated stones, used as sinkers or hammers. Six round stones about the size of an egg, found in the canoe. Of polished celts there were only six of the usual type (Pl. L., Nos. 15 and 16). One of the most remarkable features of the collection is the number of arrow-points, which exceed three hundred in number, presenting in this respect a remarkable contrast to Lagozza. As will be seen from the illustrations (Pl. LI., Nos. 1-19), these arrow and lance-heads are varied in form and exceedingly well made. Eight are of a rhomboidal shape, and a similar number have only one

barb (No. 7). Three rectangular plates of polished stone, perforated at the corners, were probably used to protect the wrist of the archer (Nos. 34 and 35). Flint saws to the extent of nearly one hundred, of which a few are unique. One has slanting teeth, as shown in No. 20, which represents both sides of the flint. A few were still in their handles when found. One is very remarkable (Pl. L., No. 12) as being formed of four separate flints fixed in a wooden casing by means of a groove and asphalt. This casing or handle has a grasping portion at each end—in short, it is a double-handed saw. The illustration represents this implement lying flat, with the horn-like ending projecting upwards at an angle of about 40 degrees, so that when placed in working position with the flints downwards the horn-like projection would be directed to the left. Hence Dr Rambotti thought the lake-dwellers were left-handed men. There were two other wooden casings, precisely similar, but minus the flints.¹

Horn and Bone.—About forty daggers and pointers of bone, of which twelve are made from split leg-bones and beautifully polished, like those from Laibach and other places. A number of small pointed objects of bone, chisels, pins, etc. (Pl. LI., Nos. 25-27). Some perforated axe hammer-heads of stag-horn (Pl. L., No. 17), also similar to those from Laibach.

Bronze.—A bronze dagger (No. 1) with a neatly worked bone-handle terminating in a button-shaped capsule. The blade was attached to a semilunar capsule of thin bronze by rivets. Portions of worked bone similar to the handle of this weapon were supposed to belong to other analogous weapons. Three flat celts of the terramara type (Nos. 2 and 3).

Ornaments.—Eight bone rings, one of which is ornamented with small circles (Pl. LI., No. 33). Three perforated buttons,

¹ Owing to a controversy about the double-handed saws, in which Mr F. C. J. Spurrell maintained that they were sickles analogous to those found by Dr Flinders Petrie at Kahun in Egypt, Dr Rambotti sent me a photograph of two of these casings (see Frontispiece). The one with the flints still *in situ* is lying flat, and the other *minus* the flints is set on edge, so as to show the bend of the pointed handle. This clearly shows that the sickle theory is untenable. (See *Prehistoric Problems*, pp. 310-314, and pls. vi. and vii.)



Polada (1-38), Cataragna (39-45). (Nos. 37 and 38 = $\frac{1}{6}$, the rest = $\frac{1}{2}$ real size.)

[To face p. 378.]



or spindle-whorls, of marble (No. 30). Several other forms of buttons in stone or marble (Nos. 21 and 32). Also perforated teeth of dog, wolf, bear (No. 31), and wild boar; and one perforated shell.

Wood.—Several articles of wood are preserved, such as handles of implements, a portion of an oar, fragments of the casings for flint saws. A stool with six legs cut out of the solid. These were mostly shrivelled up and scarcely recognisable.

Osseous Remains.—Part of a human skull. Also numerous bones of the following animals:—the urus and some other breeds of cattle, horse, sheep, goat, dog, cat (one skull), wild boar, pig, stag, and roe.

Dr Rambotti thought there was satisfactory evidence to prove that the settlement had been destroyed by fire.

No descriptive report of this remarkable lake-dwelling has yet been published in Italy, but the principal relics found on it were exhibited at a Congress of Art and Archæology held at Brescia in the autumn of 1875. On that occasion no less than fourteen pages of the published catalogue of the exhibition were devoted to the enumeration of Dr Rambotti's collection from Polada. After the death of Dr Rambotti, some years ago, the collection was transferred to the Museo Preistorico in Rome, where it is now exhibited.

Cataragna.

The peat-bog of Cataragna (Brescia) appears to have contained a pile-dwelling somewhat similar to that at Polada, and although no systematic examination of it has been made, a considerable number of relics have been collected from the peat on its site by the peat-cutters. In 1878 the locality was visited by Prof. Pigorini, Dr Rambotti, and Cav. Stefano de Stefani, who reported that there could be no doubt that a palafitte had existed at the north-west margin of the bog (*B.P.*, iv., p. 63). The Ballarini collection, which ultimately came to the Museo Preistorico in Rome, contained a large number of objects, especially vases, from Cataragna. Dr Colini has illustrated some of the more important objects in his "La Civiltà del Bronzo in Italia" (*B.P.*, xxix., pp. 53, 211), from which I have

figured a small rude vase (Pl. LI., No. 40), two arrow-points of bronze with central rib (Nos. 42 and 43), a bronze pin (No. 41), a flint lance-head (No. 39), and two stone beads (No. 44). Among other objects from this station are one or more specimens of brassards (No. 45), a funnel-shaped vase (*fischietto*), and a shallow basin with raised handle terminating in two knobs—evidently an embryonic stage of the *ansa lunata*. The stone, horn, and bone objects may be paralleled with those of Polada.

Lake Garda.

In 1851, while the harbour of Peschiera was being deepened, numerous bronze implements associated with piles deeply buried in the bed of the lake were found at a particular spot near the north mole of the fortress; but no special attention was paid to them. The bronze objects were laid aside by the workmen, and it is said that a quantity of them, weighing some 15 or 20 lbs., was sold as old metal. Of this find a very few were sent to the K. K. Antiken Cabinet in Vienna. In 1860 further deepening of the harbour became necessary, and again similar objects were found in the dredged-up stuff. These operations were conducted under the supervision of M. Lorenz and Col. von Silber, who, in the interests of archæology, collected and preserved the bronze objects. Subsequently, on its being suggested that this was a palafitte like those recently discovered in the Swiss lakes, Col. von Silber forwarded an assortment of the relics to Dr Keller at Zurich, with the following explanatory notice of the circumstances in which they were found:—

“In deepening the entrance of the harbour at Peschiera for the newly-built gun-boat, which was done by means of a mud machine (called a ‘paternoster’) to a depth of 7 or 8 feet below the usual level of the water, the workmen found amongst the mud and sand brought up by the machine a great number of bronze implements. These were carefully preserved, for the sake of archæology, by Mr Lorenz, the marine engineer, now residing at Pola, and myself. I was so uninitiated in this science, that when I found that the greater part of the objects had been taken up from a space of a very few square fathoms, I had the notion that a ship, laden with bronze, had been wrecked here, and it was not till a conversation which I had with Dr Freudenberg, of Bonn, that I was led to believe that a lake-dwelling probably existed on this spot. This idea was corroborated by the fact that just in this place the working of the mud machine

was very much impeded by a number of burnt piles which were quite covered with the mud. Unfortunately I fancied at first that these piles came from the fishermen's huts, which abound in this neighbourhood at the present day, so that I paid no attention to their position or arrangement. The piles which were drawn up were, on an average, 4 or 5 feet long, quite hidden under the sand, and burnt to such a degree that it is impossible to say with certainty what kinds of wood they were made of. I imagine, however, that the wood was chiefly that of the stone oak (*Quercus ilex*). The piles were 4 or 5 inches in diameter.

"Besides the bronze implements one of stone was found, which I believe to be a sling-stone. Lately, when reading the reports of the Swiss lake-dwellings, I remember the occurrence of a great number of pieces of burnt clay found in the mud. These pieces were of a blackish colour, remarkably thick, and without any definite form. I do not doubt that they have been fragments of the clay covering the huts of the lake-dwellings." (B. 44, 2nd ed., p. 364.)

These discoveries induced the eminent archæologist, Dr E. Freiherr von Sacken, to visit Peschiera for the purpose of investigating into the reported *Pfahlbau*. In addition to his own special researches he had correct details of the results already obtained from Captain von Kistersitz, who was present, and carefully watched the excavations during the years 1860-1-2, and from these he drew up an admirable report, published in 1864 (B. 16), which clearly proved that there was here a true pile-dwelling of the Bronze Age.

In this report the following sectional description of the sedimentary strata is given:—

(1) In a depth of about 5 feet of water there was first a sandy layer, from $2\frac{1}{2}$ to 3 feet thick, in which no relics were found.

(2) Beneath this layer of sand was the relic-bed, from 2 to $3\frac{1}{2}$ feet thick, composed of a mossy deposit containing the remains of plants, organic débris, the industrial objects already referred to, and the tops of numerous piles.

(3) Underlying the relic-bed was a thick bed of stiff loam and sand, into which the piles deeply penetrated. These piles were generally of pine and oak, the former predominating in the proportion of two to one.

The dimensions of the lake-dwelling were not accurately ascertained, but the area covered by the dredging operations exceeded 10,000 square yards, and in most of this space piles were found. No stone implements were found, with the

exception of the polished discoidal stone sent to Dr Keller ; but the number of bronze objects amounted to two hundred and fifty, most of which were sent to Vienna.

Professor Franz Unger made a careful study of the organic remains, and amongst the various fruits, plants, and wood identified by him the most interesting are rye (*Secale cereale*) and the vine (*Vitis vinifera*). The former has not yet been found in any of the terremare or lake-dwellings of North Italy.

The osseous remains represented the ordinary domestic animals—dog, sheep, goat, ox, horse, and pig—as well as the stag, roe, wild boar, etc.

Besides the bronze objects there were fragments of pottery and one or two Roman coins—one of Trajan and one of Domitian.

Meantime archæologists were on the look-out for palafittes in other parts of the lake. It appears that as early as 1861 Cav. Martinati detected piles at a place called Rocca di Garda, near Bardolino, on the eastern shore of the lake, which he considered to be the remains of a pile-dwelling. Dr Alberti also discovered similar evidence in two localities farther south, Il Bor and Porto di Pacengo, which he described in a letter to Martinati in 1864 (B. 17 and 120). This stimulated the Accad. d'Agricoltura, Arti e Commercio di Verona to appoint a Commission to investigate the matter ; but their labours were soon afterwards discontinued owing to the political disturbances of 1866, and it was not till ten years later that these proposed archæological researches were resumed and the Commission reconstituted. Although on this occasion no bronze objects were found, it cannot be said that the explorations were altogether devoid of interest, as the existence of the reported palafittes was not only confirmed, but a considerable quantity of the osseous remains of the ordinary domestic animals, fragments of pottery (including *anse lunate*), and a wooden spoon were collected. But the Commission soon abandoned the work as profitless. Then it was that Mr Alberto Cavazzocca, of Verona, commenced to search Il Bor on his own account, and succeeded in a couple of seasons in securing from it a small collection of antiquities, including objects of stone and bronze.

On the western and more sheltered shores of Lake Garda Professor Stoppani, of Milan, found traces of several stations, particularly in the Gulf San Felice di Scovolo, three of which were situated close to its northern shore, and two close to the Isola Lecchi, on the landward side of the island. As few relics were found—only a few flint objects—and as the piles in all these stations were near the shore and in comparatively shallow water, Stoppani concluded that they belonged to the Stone Age. These explorations were a sequence to the first researches in Lake Varese, so auspiciously initiated by Desor and Mortillet, and which Stoppani followed up by making an exploratory tour of the lakes of North Italy. The observations of Stoppani (B. 26), however, have not been tested by any subsequent researches, though this particular locality is pre-eminently the most fitted for lake-dwellings in the whole of this extensive sheet of water.

In 1879, under the skilful management of Cav. Stefano de Stefani (*R. Ispettore degli Scavi*), dredging operations were resumed at the old place in the harbour of Peschiera, which considerably added to the number of relics from this station.

In the spring of the following year De Stefani transferred his operations to an entirely new locality in the river Mincio, below the railway bridge, where the stream divides into a number of separate channels. Among the islands thus formed he had reason to suspect the existence of pile-dwellings, and in this expectation he was not disappointed, as he succeeded in finding not only the submerged piles and transverse beams, but also a large number of flint, some bronze objects, and a few Roman remains.

As both these investigations were undertaken by orders from the Minister of Public Instruction, and at the expense of Government, the relics were sent to enrich the Museo Preistorico in Rome.

The people of Verona were greatly chagrined to find that these successive discoveries, which had now attained much celebrity in archæological circles, were constantly slipping out of their hands, and that in their own local museum there was scarcely a single object illustrative of the culture and social condition of these early lake-dwellers. To rectify this state of

matters and make some amends for their past neglect, the Academical Commission was induced to order a fresh investigation under De Stefani, whose recent success was characterised as "risultati spendidissimi." Again the excavations of De Stefani were crowned with great success. In 1881 his attention was directed to Peschiera, which yielded him a considerable number of relics, being the fourth important supply since its discovery in 1851. In 1883 the station in the Mincio was subjected to further explorations, and De Stefani's labours were rewarded by a rich harvest of relics, mostly of the Stone Age, which included many flint implements, such as knives, hatchets, saws, arrow-points, etc.

The relics collected on both these occasions were deposited in the Museo Civico at Verona, and at last this town shares with Rome, Vienna, and Zurich the honour of possessing a collection of remarkable remains. (See B. 116, 122, 127, 139; and *Notizie degli Scavi*, 1880 and 1884.)

From these general remarks it will be seen that there are only three lake-dwellings in Lake Garda that have yielded remains sufficiently comprehensive in quantity and variety to enable us to form some idea of the period to which they belonged, viz., the station close to the fortress of Peschiera, that in the Mincio, and that known as Il Bor, on the south-east shore of the lake.

Peschiera.—Since the report of Baron v. Sacken the various researches conducted here have not thrown additional light on the general condition and distribution of the piles. De Stefani bears testimony to the accuracy of the facts as to the archæological stratum in which the relics were found, and observes that the overlying bed of sand and gravel sometimes attained a depth of over 4 feet (B. 139). In it were found decomposed organic matter, bits of charcoal, fragments of pottery, and bronze objects. In the previous discoveries only one stone implement was recorded, so that the station was considered to be exclusively of the Bronze Age. Nor was its character in this respect much altered by the recent researches, as only a few implements of stone were found, viz., two knives or scrapers, one arrow-point, and a few chips of flint, a round sling-stone of granite, and another of an oval form, with marks



Peschiera. (All $\frac{1}{2}$ real size.)



of having been used. Nothing of importance was added as regards its flora and fauna. De Stefani describes a curious object like a biscuit, picked out of the dredged stuff, which he considered might have been a cake of bread. It was made of viscous matter, and measured 4 inches in diameter, and $\frac{3}{4}$ of an inch thick, and contained bruised cereals; but as he was examining it, it slipped through his fingers and again fell into the water (B. 139).

This settlement appears to have flourished exclusively in the Bronze Age, as may be seen from a glance at the accompanying illustrations (Pls. LII., LIII., LIV.).

Pottery.—The fragments of earthenware indicate a great variety of vessels made of two kinds of paste—a coarse and a fine quality. Of the latter, Nos. 26-30 on Plate LIV. are sufficient to show that the ceramic art of the lake-dwellers was identical at one period of their existence with that of the terramaricoli, among whom the *anse lunate* were so abundant.

Bronze.—Weapons, implements, and ornaments of this material are extremely numerous, numbering upwards of three hundred objects. Among the weapons we find socketed lance-heads (Pl. LIII., No. 10), daggers (Nos. 1-7), single-edged knives (No. 11), and a remarkable series of double-edged dagger-knives with riveted tangs or sword-like handles (Pl. LIV., Nos. 10 and 12-14).

The implements include three kinds of hatchets (Pl. LII., No. 30; Pl. LIII., No. 32; and Pl. LIV., No. 11), chisels and gouges (Pl. LII., No. 36), sickles (No. 33), various forms of razors with handle and double-cutting edges (Nos. 1-5), needles (No. 7), fish prongs and hooks (Pl. LIII., Nos. 18-21, 30 and 31).

The ornamental objects are hairpins, combs, pendants, bracelets, fibulæ, and a torque. Hairpins are in great numbers and of extreme elegance, both in form and ornamentation; among them are some with amber heads (Pl. LII., Nos. 9 and 10); some have flat, others disc-shaped heads (Nos. 17, 18, and 25); especially interesting are those with heads made of various combinations of spirals (Nos. 21-27), as being identical with the hairpins of the *terremare*. Combs are made of bone

(No. 29), as well as of bronze (No. 28). Pendants of curious and varied forms are also abundant (Pl. LIII., Nos. 27-29), among which one (Pl. LII., No. 34) is of lead. The small ornamental cross represented by No. 26 (Pl. LIII.) is of tin. The fibulæ are also of diversified forms, as may be seen from the illustrations (Nos. 8 and 22-25). The bracelets are of two kinds, made of thin bands (Pl. LII., Nos. 31 and 32), one closed with a hook and the other open. Only one torque (No. 19) has been found at Peschiera, and in form it is similar to the few recorded from the Swiss lake-dwellings. (See *Lake-dwellings of Europe*, fig. 10, No. 3.)

Finally, there are a few spirals, bits of wire, and one special object of unknown use¹ (Pl. LIII., No. 17).

The relationship between these objects and analogous remains in foreign countries is most exhaustively and ably dealt with by Professor Pigorini (B. 104).

Mincio.—As the surplus water of Lake Garda, under the name Mincio, passes beyond the railway bridge, it divides into two larger channels and some smaller ones, forming a series of acutely pointed islands. The bed is here irregular, and at various points the tops of piles were seen in groups projecting from the bed of the river. The first explorations were in the larger channel to the left. Here De Stefani (B. 122) found several objects of antiquity, among which the following are the principal :—

Bronze.—The corroded blade of a knife-dagger (double-edged), portion of a dagger-blade with a midrib, and of another with deep longitudinal grooves, also portions of a small disc and of a spiral.

Flint.—Two rectangular-shaped hatchets, a saw (curved), a javelin, an arrow-point, a lance-head, small knives, and a large quantity of chips, cores, and crudely shaped objects.

Pottery.—Two spindle-whorls, a quantity of handles, and fragments of dishes.

Stag-horn.—Portions converted into the form of a hatchet, a hairpin, and several other objects.

¹ A precisely similar object has been figured by Crespellani among the relics found on the terramara of Redù, in the province of Modena (see *Terremare Modenesi*, 1892-3; *B.P.*, xxi., p. 146).



Peschiera. (No. 32 = $\frac{1}{4}$, and all the rest = $\frac{1}{2}$ real size.)



Bones, etc.—A large quantity of teeth and bones of the ordinary domestic animals.

At another place some 200 yards lower down in the central canal, amidst a group of piles, he collected:—

Bronze.—A knife (Pl. LIV., No. 17), two small dagger-blades with rivet-holes; the point of a sickle; two bits of the cutting ends of axes (paalstabs); two hairpins 10 inches long, and three smaller ones; a disc-shaped head of a pin; portions of a fibula; together with fragments of various other undetermined objects. One interesting relic is supposed to be the terminal knob of a handle (No. 25).

Stone.—One portion of a polished stone of basalt (No. 19).

Flint.—The implements of this material (Nos. 1 to 9) were here in great abundance. Eighteen hatchets, mostly of a rectangular form (No. 9); sixty saws (Nos. 5 and 6); forty-nine arrow-points (Nos. 1 to 4), of which one (No. 4) has four barbs, and another is chisel-shaped (No. 8); thirteen lance-heads (No. 7), etc.

Amber.—Two beads, one reddish and the other yellow.

Pottery.—Various fragments, especially handles of vessels of different forms—*cornuta*, *lunata*, *lagotis*, *bitubercolata*, etc. Some of the dishes were of fine black ware, among which may be noted a spoon (No. 30), but, as a rule, the coarser kinds predominated. Spindle-whorls were also numerous and varied in form, not less than thirty-one having been collected. There were also two large net-weights, one round and the other ring-shaped.

Stag-horn.—Several worked portions; one was part of an ornamented comb, and another that of a handle of some sort.

Money.—Four coins, much corroded, supposed by De Stefani to be of the second half of the third century.

In 1883 De Stefani resumed his researches in the same place (B. 139). On this occasion the bronze objects were limited to one or two insignificant fragments; but, on the other hand, the flint implements increased—knives, saws, javelins, lance-heads, and arrow-heads being in abundance. Among other things may be mentioned two small stone discs, perforated, probably used as spindle-whorls; a small bit of green glass; and portions of worked and unworked horn, bone, etc.

The ornamental blade (Pl. LIV., No. 18), a neat spiral-headed pin (No. 22), and a stud (No. 23), all of bronze, which I observed in the collection of Dr Rambotti, were said to be from the station Il Mincio.

Il Bor.—Previous to the investigations at Il Bor by Cavazzocca (B. 120), Dr Alberti had estimated the number of heads of piles visible on this site at five hundred, but the former considers this number rather high. The station stretched parallel to the shore, from which its site is now distant about 100 yards; but it is supposed that the present level of the water stands higher than it did in the days of the lake-dwellers. One reason for this opinion is that a triple row of piles which runs shorewards and is considered to be the remains of a gangway, was found to terminate suddenly about half-way. The *strato archeologico* lies under a thin covering of sand and gravel, which Cavazzocca explains to be the débris of the disintegrated morainic coast carried outwards by the boisterous action of the waves.

The principal relics collected by Cavazzocca, most of which are illustrated in his monograph, are as follows :—

Bronze.—Four knife-daggers similar to those from Peschiera; three pin-heads like those from the terremare (Pl. LIV., No. 24); one axe-head with wings; one conical button; two chisels (No. 15); four hairpins; two fragments of spiral tubes (No. 20); and six undetermined objects.

Pottery.—Diverse forms, including *anse lunate* and fragments of vessels; spindle-whorls, etc.

Stone.—Three fragments of stone moulds; several whetstones; an arrow-head; knife; and several chips of flint.

An arrow-point of bronze (No. 16), and a couple of small daggers from Il Bor, are in the Museo Preistorico in Rome.

Further Explorations at Pacengo.

In 1892 the brothers Balladoro commenced dredging operations at the two adjacent stations of Porto and Il Bor, opposite Pacengo, and by 1895 they secured a large assortment of relics similar to those already recorded from Il Bor and Peschiera. Although the collection contains few objects presenting new features, it is of some value in proving that the stations of the



Peschiera (10-14, 21, 26-29, 31), Il Mincio (1-9, 17-19, 22, 23, 25, 30), and
Il Bor (15, 16, 20, 24). (All $\frac{1}{2}$ real size.)

east shore of Lake Garda were occupied by a flourishing community, apparently from the Stone Age down to the early Iron Age. The various objects are briefly described in the *B.P.*, xxv., p. 32, from which the following summary is taken.

Porto.

Flint.—Two hundred and twenty arrow-heads, both winged and triangular, some with serrated edges; eighty axes (*accette*), in the form of four-sided flints, worked on both ends; two hundred and thirty-two saws, with straight and curved edges; one hundred and sixty scrapers, single- and double-edged; twelve lance-heads.

Stone.—One polished triangular-shaped axe; eight polishers; seven brassards, with two holes at each end; two heavy weights, perforated.

Bronze.—One axe, with raised edges; one torque, like the one from Peschiera (Pl. LII., No. 19); one harpoon, like that in Plate LIII., No. 21; four daggers, one being ornamented; eight hairpins; five clasps.

Terracotta.—Pottery was scarce and contained no *anse lunate*, but the spindle-whorls amounted to eighteen specimens.

Il Bor.

Flint.—Forty arrow-heads; fifty-eight saws; nine knives and scrapers; one borer.

Bronze.—Twenty-three dagger-blades; twenty needles; one razor, like that on Plate LII., No. 5; one socketed lance-head; eight spirals; three conical buttons; seven pointers; one harpoon; one nail; four fish-hooks; one comb, with eight teeth and ornamented with graffite; six pendants of various forms; one sickle (only a portion); two winged axes (only upper portion of one); one oval bead; a portion of a sword or dagger; twenty-six hairpins (six with heads like No. 26, Pl. LII.); twelve pins with flat heads; six arrow-points (winged); a number of small pieces.

Tin.—One wheel or ornamented top of a pin; a long pointer, with hole at one end; several heads of pins.

Stone.—Twelve weights; five polishers, and many fragments showing workmanship; seven moulds (fragmentary).

Terracotta.—Two net-weights with cylindrical perforations; thirty spindle-whorls; nineteen small vases; fragments of pottery, with geometric ornamentation; handles, for the most part of the *ansa lunata* type.

Cascina, etc.

The Torbiera di Cascina (Veronese) has from time to time yielded objects which belonged to pile-dwellers. The station was first recognised by Martinati (*Adige*, 1874, No. 23) who found flint arrow-points, a laurel-leaf shaped lance-head, some stone implements, portions of stag-horn, etc. In 1878 Pigorini

gives a further account (B. 113 (d)) of some of the objects since discovered, including eighteen flint pieces—arrow-points of various forms (one of the so-called rhomboidal type), a magnificent lance-head, a fine saw, and one small triangular form. In the Museo Preistorico in Rome there are also preserved a bronze axe of the flat type (Pl. XLV., No. 9), and a curious bronze knife (No. 12), similar to those from the lake-dwelling at Peschiera, which were found in this place.

Martinati (*B.P.*, i., p. 179) also describes another small turbary in the vicinity of Lazise, in which three rows of piles were encountered, and associated with them were fragments of black pottery. It was also reported at the time that formerly entire vessels of the same kind were found in the locality.

Lake Fimon.

About 4 miles to the south of Vicenza, at the southernmost point of an irregularly-shaped valley of rich meadow-land, lies the small lake of Fimon. At the present time it is hardly a couple of miles in circumference, but before the Debba Canal, which carries its surplus water to the river Bacchiglione, was cut, it is known to have been considerably larger, and in prehistoric times it is supposed to have covered the larger part of the valley. In a meadow called Pascalone, near its north end, and close to where the Debba Canal begins, Mr Lioy detected the tops of piles jutting out of the grass, which he at once concluded to be the remains of a lake-dwelling—a supposition which was completely verified by extensive excavations. The surface of the meadow where these piles were visible was less than 2 feet above the level of the lake, and on making excavations over a selected portion the following facts were ascertained:—

Piles.—The piles were from 8 to 12 inches in diameter, singly and irregularly placed, but sometimes in groups; some were hard and black (oak), and others soft, but they bore no traces of any cutting implements. In some instances they were surrounded with heaps of stones. They penetrated deeply, and one which was pulled up measured 18 feet in length. No traces of a gangway stretching to the shore could be discovered.

Relic-bed.—Below a thin covering of vegetable-mould there

was a peaty bed about 16 inches thick, and underneath this 3 or 4 inches of lake-marl, containing various kinds of fresh-water shells. To this succeeded the *strato archeologico* with its various contents—decomposed organic matter, broken bones, fragments of pottery, flint implements, and other worked stones, bits of straw, reeds, charcoal, clay-plaster, burnt faggots, etc. This bed was about 12 inches thick, and its matrix was of a yellowish black colour, which, when cut into, had a doughy consistency and emitted a strong sulphurous smell.

Relics.—The rough stone implements were partly made out of the limestone of the neighbouring hills, very seldom of sandstone, but more frequently of flint from the spurs of the Alps. These flints were in considerable numbers in the form of chips, nuclei, and unfinished implements, very few being well-formed tools; some rudely formed arrow-points, lance-heads, knives, and saws or scrapers; pebbles of limestone, probably hammer-stones; stone discs, 2 to 4 inches in diameter (one perforated); numerous sling-stones made of sandstone, basalt, and serpentine; one fragment of granite, flattened and polished on all the four sides; and one small polished stone celt. Many of the bones were worked, and there were tynes of stag-horn, sharpened at the tip and perforated at the base; also pointers, spear-heads, spatulæ, and splinters of all kinds.

The fragments of pottery were so plentiful that a handful of mud could not be taken up without finding some pieces in it. Amongst some thousands of fragments about fifty vessels, in a more or less perfect condition, were picked out. They are all of a dark colour, with handles attached, generally below the rim, and flat bases. Some of them have everted lips, and many are ornamented with knobs, depressions, or raised ridges (circular, wavy, or confluent). Some of the handles approach the form of the *ansa lunata*, others terminate in a round button (*ansa mono-appendiculata*). One small bowl had two handles. The paste was of two qualities; one fine, and the other mixed with coarse bits of gravel, quartz, and carbonate of lime.

There were also numerous specimens of spindle-whorls in the form of flat circular cakes of clay, like small wheels, and unornamented.

Among the organic remains were the fruit of the water-chestnut (*Trapa natans*), kernels of cherries, hazel-nuts, acorns, bramble seeds, etc.

The bones of the stag and wild boar predominated among those of the sheep, ox, roe, badger, etc. Among the food-refuse was a large quantity of the broken carapaces of a small freshwater turtle (*Emys lutaria*) (B. 22, 39, 48).

Some five or six years later (1871) Mr Lioy made further excavations near the same place, and came upon a relic-bed 8 inches in thickness and only 16 inches below the surface, which he considered to be the remains of a pile-dwelling of a later age. In this relic-bed he found a bronze celt (Pl. LV., No. 1) and some flints of a grey-reddish or yellowish colour (different from the blue variety in the earlier dwelling), but no stone implements and no arrow-points. Pottery was not abundant, but it was made of finer quality, and the ornamentation shows a higher style of art. Mr Lioy also observes that the bones of the domestic animals, such as sheep and oxen, were now in excess of those of wild animals.

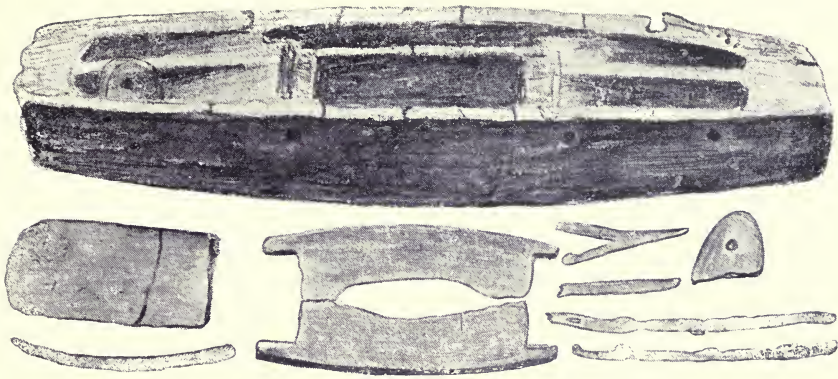
As a final report on the *abitazioni lacustri* of Lake Fimon (B. 98) Mr Lioy has published a lengthy monograph, with numerous plates of illustrations. The work, however, deals more with extraneous and general considerations than specific facts and details bearing on the remains of the palafittes and their inhabitants. I consider the station at Polada far more typical of the Stone Age lake-dwellings, and accordingly I have selected it as a standard of comparison for such remains in the eastern portion of the Po Valley. The illustrations from Lake Fimon are therefore restricted to the few objects on Pl. LV., which include a bronze flat celt (No. 1), a large clay ring (No. 2), and a few specimens of pottery (Nos. 3-8).

Valley of Fòntega.

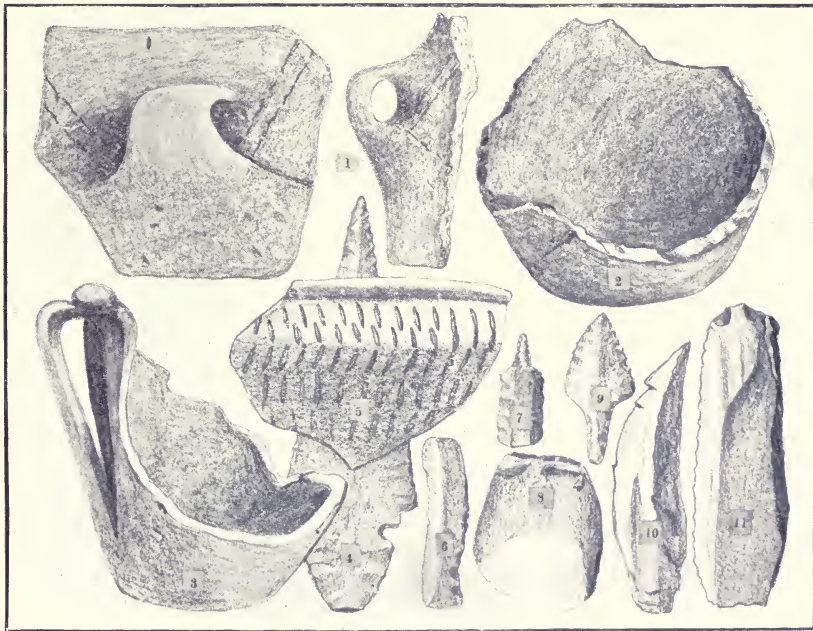
In January 1890 I received from Dr Luigi Meschinelli a copy of an article by him, entitled, "Studio sugli Avanzi Preistorici della Valle di Fòntega" (B. 155). The objects described in this memoir were found in the course of excavating peat in a small valley opening into Lake Fimon, and which formerly formed part of that lake. Among a quantity of the



Fimon (1-8), Arquà Petrarca (9-12). (All $\frac{1}{3}$ actual size, except No. 2 = $\frac{1}{6}$.)
(After Liroy and Cordenons.)



A.—A wooden Machine, supposed to be a Trap, found at Fòntega.



B.—Nos. 1-3, 5, Specimens of Pottery; No. 4, Lance-head of Flint; Nos. 6, 7, 9-11, Flint Implements; No. 8, Polished stone Axe. (Nos. 1 and 2 = $\frac{1}{2}$; all the rest = $\frac{1}{2}$.)

Various Relics from the Peat Bog of Fòntega. (After Meschinelli.)



industrial remains of man, consisting of fragments of pottery, various implements of stone and flint, a bronze knife, and a Roman coin of the time of the Emperor Hadrian, were three curious-looking objects of wood shaped like a canoe in miniature. One of these machines, the best preserved though not the largest, was carefully described and figured (Pl. LVI. (A)). It was constructed out of a solid piece of oak measuring 28 inches in length, $6\frac{3}{4}$ in breadth, and $2\frac{3}{4}$ in thickness. The opening in the centre was fitted with two valves (here figured as detached), and measured $6\frac{1}{2}$ by $3\frac{1}{2}$ inches, this being the actual size of the aperture when the valves were in position and open. On the off-side of the drawing there is to be seen a deep groove in which the corresponding valve revolved on its outer edge; also at each end of the aperture are transverse chamfers which supported the valves when closed and prevented them falling through. On the under-surface the sides of the central aperture are described as not being cut perpendicularly, but slanting outwards, thus widening its outer margin to 11 inches by $5\frac{1}{2}$. In addition to the elongated hollows and transverse holes near both ends, four other small holes may be noticed, one opposite each of the valvular pivots, into which pins were inserted—evidently for the purpose of preventing the displacement of the valves. Associated with this machine, as seen in the illustration, were several worked sticks, supposed to be the remains of some kind of mechanism for working the machine. The other two machines were, according to Dr Meschinelli, precisely similar, so that in all essential particulars these Fòntega novel objects were identical with those described by me as so-called otter and beaver traps (*Lake-dwellings of Europe*, p. 179), specimens of which first attracted my attention as having been found in a pile-dwelling at Laibach.

In attempting to assign any utilitarian purpose to these novel objects from Fòntega, Dr Meschinelli (who was then unaware of the existence of similar machines elsewhere) was apparently much puzzled, but at last suggested that they might have been models of prehistoric boats (B. 156 (*b*), 158 (*a*)).

Subsequently, on being informed of analogous discoveries in other parts of Europe, Dr Meschinelli published a second

memoir on the subject, in which he rejected all previous theories as to their function, and came to the conclusion that they were traps for catching water-fowl (B. 160).

In 1895 (B. 172) I received from Sig. Lioy a copy of an article by him, entitled, "Le Misteriose Barchette della Fòntega (Fimon)," announcing the discovery of two more of the "barchette" in the peat-bog of Fòntega, being in all five from that locality.

Similar machines have now been recorded from Ireland, Wales, Denmark, Germany, Styria, and Italy, amounting in all to over forty specimens. Although there is a consensus of opinion that they are traps for catching wild animals, there is no agreement as to their precise *modus operandi*, nor yet as to the animal they were intended to trap. A complete report of these curious and widely distributed objects, as well as of the literature to which they have given rise up to 1897, will be found in *Prehistoric Problems*, chap. vi. Mr Edward Krause of Berlin reviews the discussion on "die sogenannte 'Otterfalle' oder Biberfalle," in his book on *Vorgeschichtliche Fischereigerate* (1904), and advocates the hypothesis that they were exclusively used for trapping water-fowl, especially wild ducks.

There is no evidence that a palafitte existed at Fòntega, but yet it has yielded a considerable quantity of industrial remains, including some canoes, which went to pieces on exposure. The following are some of the relics found in the peat and recorded by Dr Meschinelli (B. 155 and 158 (a)). A bronze knife, 25 cubic metres in length, of which the blade takes 13.5 cubic metres; a finely polished axe of serpentine, 13 cubic metres long, and two small ones (Pl. LVI., No. 8); at a depth of 2.20 metres there was found a fine lance-head of flint (No. 4). Other flint implements are represented by Nos. 6, 7, 9, 11. Among the specimens of pottery, Nos. 1, 2, 3, and 5 show that the ceramic art at Fòntega was similar to that of the pile-dwellers of Lake Fimon.

Arquà-Petrarca.

In the neighbourhood of Padua remains of lake-dwellings, presenting in many respects features analogous to those in

Lake Fimon, have been discovered in the small lake of Arquà-Petrarca, situated in the Euganean hills. The discovery was made in the autumn of 1885 by Professor Frederico Cordenons, who, with the aid of funds from the museums at Padua and Este, made excavations during the following summer, the result of which was duly published (B. 152 (*bis*)). It appears that the lake, though now only covering some dozen acres, was formerly of much greater extent and occupied the whole of the present valley. In the slime of this ancient lake-basin, which is now overlaid with a deposit of peat over 3 feet in thickness, the remains of two stations were found, one on the eastern and the other on the western margin of the present lake. These remains, consisting of piles, portions of transverse beams, and a large assortment of the industrial débris of the inhabitants, are entirely confined to the ancient mud deposit, nothing being found in the peat above it. Mr Cordenons does not give us as minute a description of the relic-bed and its surroundings as could be desired; but as only a fourth of the area occupied by the piles had been excavated (1000 square yards) this report may be only a first instalment of the researches.

Among the objects collected, the following will give a general idea of its chronological position with respect to analogous remains in the Po Valley:—Several perforated stone-axes; half of a perforated hammer-axe of green serpentine, beautifully polished; a large hammer-stone; a beautiful flint saw, 4 inches long (“un bellissimo coltello-sega”); portion of a finely worked laurel-leaf shaped lance-head of flint; a number of arrow-heads, lance-heads, saws, knives, etc., of flint.

Objects of stag-horn were not numerous, the chief being some perforated rings the use of which has given rise to some controversy.

The pottery is abundant, and with the description of it much of Cordenons' monograph is taken up. The paste in the generality of the vessels is mixed with sand and bits of mica from the débris of the surrounding hills. Only one dish (Pl. LV., No. 11) shows ornamentation of incised

lines, but, on the other hand, raised lines meeting in points, forming triangles, etc., are most common. The handles are of various shapes and show a complete series of progressive stages, from the single button-shaped top to the almost perfect *ansa cornuta*.

No metal objects were found, and consequently Mr Cordenons concludes that the station belonged to the pure Stone Age, a conclusion which, however, Pigorini disputes (B. 154 (c)).

The pottery is very similar to that from the adjacent lake-dwellings at Fimon, and by no means dissimilar to that from Polada.

Since 1900, when the above notice was written, further excavations have been made on this site under the care of Professors A. Moschetti and F. Cordenons. A report of their operations has been published in the *Bollettino del Museo Civico di Padova* for 1901. According to Pigorini (*B.P.*, 1901, p. 265), the following are the most important results :—

In the shallow parts of the ancient lake the inhabitants did not construct true palafittes, but raised a solid structure of stones, earth, fascines, and short piles till the surface of the mass reached above the level of the water. In somewhat deeper water they constructed a series of wooden compartments of piles and transverse beams, the interstices being filled with bits of split wood, twigs, and earth, over which a uniform platform was laid. Here and there over these platforms, hearths were constructed of stone cemented with clay. The relics worthy of note, besides the pottery, which was of the usual character found in the early lake-dwellings, were a disc of horn perforated in the centre, a spindle-whorl, and a clay spoon.

In the year 1906, in the course of carrying out agricultural operations on the shore of the lake, the workmen turned up remains which point to the discovery of another lake-dwelling in Arquà. The objects were sent to the Archæological Museum at Este, and thus came to be described by Sig. A. Alfonsi (*Notizie d. Scavi*, 1906). Among the relics were three whole dishes, a finely worked flint dagger, 4 inches long and $\frac{3}{4}$ of an inch broad; fragment of a perforated hammer-

stone and three bone pointers; together with bones of deer, ox, pig, and goat (*B.P.*, 1907, p. 185). The *ansa lunata* in its various forms was conspicuous among the pottery. Sig. Alfonsi assigns the stations in Lake Arquà to the early Bronze Age, and parallels them with Polada and Fimon.

CHAPTER XV

RELATION BETWEEN THE TERRAMARICOLI AND THE NEOLITHIC HUT-DWELLERS

Introductory. Hut-dwellings in the Po Valley. Mixed Stations in the Vicinity of Bologna, Imola, the Marche, and South Italy. Burial Customs of the Terramaricoli and of the Western Lake-dwellers. The Racial Problem.

IN the previous lectures I have described, more or less in detail, the structural remains and industrial relics found on the sites of the palafittes of North Italy, whether constructed in lake, marsh, or on land. When I had the opportunity of bringing this subject before English readers in 1890, the ground occupied by these settlements was almost entirely confined to the Po Valley. The *terremare* were located chiefly in Emilia on both sides of the railway, extending from Piacenza through the provinces of Parma, Reggio, and Modena, on to Bologna. They were also found north of the Po in small groups in the provinces of Verona, Mantua, and the adjoining parts of Brescia and Cremona. They were not, however, recorded in the Veneto nor to the west of Emilia. As to their origin, it had been long held by Pigorini that they were an outcome of the lake-dwelling system. He supposed that their founders, who originally were lake-dwellers, having crossed the Po, were so attached to the method of constructing habitations on platforms supported on wooden piles, that they continued this same method, not only on the low-lying plains, but also on hilly districts up to the foot of the Apennines. Chierici went so far as to maintain that in laying out a settlement they actually made an artificial lake, and kept it supplied with water from an adjacent stream. Later researches, however, proved that these hydrostatic arrangements were merely to convey water to a moat which usually surrounded the village.

The remarkable discoveries made by Pigorini at Castellazzo, as already described, show that this kind of settlement was wonderfully complete, having all the requirements of village life with adequate security—moat, rampart, palafitte, streets, citadel, ritual trenches, etc. The theory that this was the normal condition of a terramara village was strengthened by analogous discoveries at Rovere di Caorso and Montata dell'Orto, both situated in Western Emilia; and hence Pigorini and his modern disciples are now excluding from the category of *terremare* all stations which do not possess the special arrangements observed at Castellazzo. Mr T. Eric Peet, a Craven Scholar of the University of Oxford, who has made a careful study of the subject, thus describes these later views:—

“On the eastern edge of the *terramara* country, or even within this country, were found some years ago a series of stations which were erroneously taken for *terremare*, but which in reality are groups of hut-foundations. The mistake was indeed very natural. The exact nature of a *terramara* was as yet not known. The posts which formed the walls of the huts might well be taken for piles, and much of the material found is identical with that of the *terremare*. Thus, even when Munro wrote in 1890, the station Chiavichetto was believed to be a true *terramara*. More accurate research into the precise nature of the *terremare* has since disproved this. To discover the real nature of these stations and to see how the error arose, we must shortly examine the most important of them, Monte Castellaccio, Fiastrì and Romei, and Demorta.

“As early as 1873 a settlement was discovered on the plateau of Monte Castellaccio (Munro, p. 205) and was described as a *terramara*. The station really consists of a number of hut-foundations. The so-called piles are merely the upright posts which formed the framework of the walls. These posts were sunk about 1 metre into the soil, and were from 8 to 20 centimetres in diameter. Several fireplaces were found. They consist of clay hardened and baked by the fire. Very interesting is the discovery of several pits, circular or oval, 60 centimetres deep. The circular pits vary in diameter from 65 centimetres to 160 centimetres. The largest oval pits had a diameter of 3.60 metres. All the pits were filled with refuse consisting of charcoal, bones, sherds, etc. Near a fireplace one of these pits was always to be found, except in two cases. The two fireplaces in question were the only two around which the refuse was allowed to accumulate. The hut-foundations were in two distinct layers. The earlier group had been destroyed and covered with earth; the later group was then built on the newly-formed level.” (*The Stone and Bronze Ages in Italy*, Oxford, 1909, p. 372.)

Professor Colini in his famous article, “La Civiltà del Bronzo in Italia,” defines the position and character of these collateral habitations more precisely (B. 191 (a), p. 76). He states that,

within the territories occupied by the eastern group of lake-dwellings and the *terremare*, there are the remains of other inhabited sites whose structural features are different, and which are therefore regarded as the works of a different population. These consist of villages composed of huts having their foundations either semi-subterranean, or placed on the surface, with the hearth in the centre. Besides these there are certain caves which during the Neolithic and Bronze Ages served successively as dwelling-places and tombs. Similar stations containing huts and utensils of bronze and ceramic characteristic of this civilisation are to be found on the whole of the Adriatic slopes of North Italy—at Villanova and Bertarina di Vecchiazano (Forlivese), at Prevosta, Castellaccio, and Toscanella (Imolese), at Castel dei Britti (Bolognese), near Porta Azeglio and Villa Bosi at Bologna, at Marendole (Padua), etc. To these may be added the remains of Fiastri and Romei (Reggio), of the Campo di Chiavichetta di Regona (Brescia), of Demorta (Mantua), etc., and certainly the archæological deposits in the Grotta del Farneto (Bologna).

The evidence in support of the above classification may be thus stated—the absence of a *palafitte* and the presence of hut-foundations containing stone implements and pottery of Neolithic types, including the handle known as *cilindro-retta*. On the other hand, all the bronze objects and a large amount of the pottery are identical with those which are universally accepted as characteristic of the *terremare*. Mr Peet accounts for this *mélange* of objects from different cultures as follows :—

“What, then, is the explanation of the strange mixture, and who were the inhabitants of these caves and huts? The question is not difficult. We will assume for the moment a hypothesis which we hope to justify later, namely, that the lake-dwellings and *terremare* were the homes of a people who entered Italy early in the Bronze Age, and who differed in race from the Neolithic people of the country. It is, then, obvious that the people who lived in huts during the Bronze Age were the descendants of the old Neolithic folk. The immigration of the new race did not entirely drive the old race out of the Po Valley. They continued to live in dwellings of the old type, but they adopted much that was useful from the new-comers. It was from these last that they received their first knowledge of bronze, at any rate all their bronze implements are of *terramara* type, and they also employed a considerable quantity of *terramara* pottery.

Whether they made this themselves or imported it ready-made we can hardly say. Supposing, however, that they traded for it, it is difficult to see what they can have given in exchange, except perhaps flints." (*Loc. cit.*, p. 381.)

As there are, however, different opinions held on the subject by other Italian archæologists, it will be necessary to look into the special features of a few of these hut-habitations, which are exclusively assigned to the Neolithic folk of the pre-terramara period. We will begin by noticing one or two examples on both sides of the Po, and then follow their distribution southwards along the slopes of the Adriatic.

Hut-dwellings in the Po Valley.

Romei, Fiastri, and Servirola.—In 1875 Chierici, while inspecting some excavations conducted by agriculturists in the terramara deposits at Romei, near Enza (Reggio), drew attention to the fact (*B.P.*, i., p. 116) that among the industrial remains collected from this station (which consisted of the usual terramara relics, such as pottery, including *ansa lunata*, portions of worked horns, bones of animals, etc.), there were no objects of metal. Among other objects were clay spindle-whorls, portions of beaten pavement, a spheroidal stone hammer (perforated), a quantity of natural pebbles, some of which might have been used as pounders and others as sling-stones. In another part of the débris were found flint implements, arrow-heads, saws, and scrapers of elegant workmanship. There were also a series of rough flakes made from other stones than flint, which appeared to have been intended to be used as tools. No hut-foundations were found, and the deposits were thinly scattered over the site, which nowhere exceeded 40 centimetres thick. In one place Chierici observed traces of a rampart (*argine*). In his opinion the station might be regarded as an incipient terramara.

The facts thus disclosed were hitherto unknown to Chierici as occurring on the south side of the Po, but they could be paralleled on the north side in Lake Fimon, at Bigarello, Chiavichetto di Seniga, and Castellaro di Gottolengo, in all of which were found flints, *anse lunate* and bronze objects (*B.P.*, i., 119).

Again, in 1877, Chierici states (*B.P.*, iii., 107-8) that the two stations of Romei and Fiastri are the only ones on the right bank of the Po which had the *ansa cornuta* associated with worked flints, as was the case at Demorta; and for that reason he proposed to place them in a different category, reserving the name terramara for those stations with artificial basins which had no flints, but only bronze objects associated with the *ansa cornuta*. Later in the same year (*B.P.*, iii., p. 174); in an article on "Stratificazione coordinate delle tre età preistoriche," he informs us that in three places within the province of Reggio, the sites of which contained no hut-foundations, flint industry was associated with terramara pottery, viz., Romei and Fiastri, situated on the plain, and Monte Venera, on a hill. The latter he describes as made up of three successive deposits, of which the middle one was terramara containing bronze objects. The deposit above these terramara remains disclosed traces of the Iron Age; while in that beneath them were hut-foundations, flints, bones, and pottery, including the handle known as *cilindro-retta*, said to be a Neolithic type.

In the same article (p. 222) Chierici puts into tabular form the succession of archæological débris found on the station of Servirola (Reggio), corresponding to the three ages of Stone, Bronze, and Iron. The inference from these, and other data which could be given, is that some of the terramara settlements had been erected on sites formerly occupied by hut-villages, while above the débris of these same settlements, structures and relics of the Iron Age are sometimes found, indicating that terramara civilisation had come to a close about the beginning of the early Iron Age.

Demorta.

The station of Demorta (Mantua), to which frequent reference has been made as being analogous to the mixed settlements of Reggio, was explored by Chierici in 1876, the results of which were published in the following year (*B.P.*, iii., 97). I have, therefore, selected it, from among a number of other stations of the same character, for



Demorta. (Nos. 1-19= $\frac{1}{4}$; 20-22= $\frac{1}{2}$.) (After Chierici.)

a more detailed examination of its special archæological features.

The valley of Demorta has long been utilised for growing rice, and through the rice-workers, Arciprete Francesco Masè, already well known as a student of prehistoric antiquities, became aware of the existence of the débris of some kind of human habitation in that locality. The station is situated at a protruding angle of a tortuous valley from 50 to 100 metres in breadth, and having its surface about 3 metres below the general level of the surrounding fields. In the month of September 1876, Masè invited Chierici to come and assist him in exploring the site. Trenches were dug in various directions, principally in and around a sandbank, during which a considerable quantity of the usual remains of human occupancy was turned up. The archæological data gathered during the operations were not of so decided a character as to enable him to pronounce definitely on the manner of habitation pursued by the inhabitants of this settlement. The general conclusion to which he came was that at Demorta there lived an ancient people, not merely for a short time, who possessed no metal and had their weapons and tools manufactured by flint implements. As to the position and structure of the huts he formulated two hypotheses—either the inhabitants were stationed in huts on dry land around a pool of water, or they lived over the water in pile-dwellings. For various reasons he rejected the former alternative, and described the station as *l'embrione di una terramara*.

Chierici seems to have been greatly puzzled as regards the true nature of the settlement, partly owing to the absence of piles and partly to the smallness of the site, which he estimated at not more than a third of a hectare, while, in his opinion, an ordinary terramara should cover at least 3 hectares, *i.e.* a little over 7 acres.

The industrial remains, especially the pottery and worked flints, were, however, so closely analogous to those found on terramara sites, that he finally assigned the Demorta station to that category of prehistoric remains. The vases, which were all hand-made and baked in an open fire, were of two

kinds. One (Pl. LVII., Nos. 1-8, 10, 13, 14, 15, 17, and 18), made of purified clay and sun-dried, had a dark surface apparently polished with a spatula. The vessels thus made were more elegant in form and more highly ornamented than those of the other class of pottery. The most common form was a flat, wide-mouthed cup, with a handle raised above the rim and ending in a kind of horned projection (No. 1). Typical of this settlement is a handle having the horns, as it were, cut short, as shown in Nos. 1, 3, and 5, and to which Chierici gave the name *anse à mazzuolo*. To the finer vases only were appended these horned handles, and their ornamentation was also peculiar, being composed of impressed dots and lines made with a blunt instrument. The designs thus formed assumed various patterns—bands, triangles (Nos. 7-17), rectangles, zigzag (18), and an imitation of basket-work (No. 10).

The other and rougher variety of pottery was made of coarse clay, and ornamented with various kinds of knobs and bands in relief (Nos. 12, 16, and 19). One object found at Demorta, to which Chierici could find no parallel among terramara "finds," was the base of a vase having its outside ornamented with graffiti (No. 9). Other rare objects were two cylinders of black clay perforated lengthways through the centre (No. 11).

Among the ordinary relics were a large quantity of flint chips and worked flakes, chiefly in the form of knives, some of which had been chipped both on the side and at one end (No. 20). There were four saws, two smaller and one larger than that here figured (No. 21), having rectangular or slightly curved ends, and showing a peculiar glistening appearance on the portion that had been in use. Two flint arrow-heads with concave bases (No. 22), the point of a flint dagger or lance-head, four clay spindle-whorls, a clay disc, one upper and five lower stones of saddle querns, complete the list of industrial remains. Neither polished stone implements nor worked objects of bone were found at Demorta. According to Strobel, the fauna included the ox (two varieties), pig (*Sus palustris*), wild boar, goat, dog, and red-deer.



A.—Marendole (1-11), Bosnia (12), Corneto (13), Rome (14).
(No. 1 = $\frac{1}{3}$; all the rest = $\frac{2}{3}$.) (After Cordenons.)



B.—Handles for comparison from Bosnia. (Nos. 1-5 = $\frac{1}{2}$; 6, 7 = $\frac{1}{4}$.)

Pottery from Marendole and other Localities.

Marendole.

In 1888 Professor Cordenons (152 (*bis*)) gave a somewhat rambling account of a number of prehistoric hut-villages discovered in the Euganean district of the Veneto, among which that of Marendole, near Este, is remarkable for its vases, which differ, especially as regards the shape of their handles, from all those previously known in Italy. A few illustrations of these novel handles were published at the time, and attracted the attention of Dr Moritz Hoernes of Vienna and Dr Oscar Montelius of Stockholm, on account of their similarity to handles found at Sobunar, near Sarajevo, in Bosnia. Since then, Cordenons has published (B. 179 (*a*)) a more elaborate and informing paper on his discoveries at Marindole, with numerous illustrations, which have supplied the writer with the substance of the following notes.

The station is situated in low-lying ground, which, till recently, had been covered by a stagnant marsh. Judging from preliminary discoveries and the appearance of the locality, Cordenons expected to find the remains of a palafitte, but excavations soon proved that the culture-bed, which lay under a thin covering of peat, contained only the usual *fondi di capanne*. These are mostly circular and of small dimensions. The floor was made of beaten earth, and lay a few centimetres lower than the surface of the archæological débris. The central hollow, which contained the hearth, was slightly oval in shape, and had a maximum diameter of 3 metres and a depth of about .90 metre. Near the huts were cylindrical refuse-pits, about 1 metre in diameter and the same in depth. Although no bronze objects were found by Cordenons, he had no hesitation in assigning the station to the Bronze Age—an opinion which was subsequently confirmed by the discovery in the same débris close by of two bronze objects, viz., a small blunt chisel and a dagger-blade in the form of a laurel leaf (Pl. LVIII. (A), No. 1).

The vases, which were made of paste mixed with coarse sand from the neighbourhood, presented more elegant forms and better workmanship than those of the Stone Age. It was, however, in respect of their handles that the Marendole ceramic

acquired its special importance. According to Cordenons the lake-dwellers of the Veneto were the inventors of the *ansa lunata*. In support of this hypothesis he instanced the presence of a series of transition forms in the stations of Fimon, Arquà, and Lake Garda, showing a gradual development of the *ansa lunata* or *cornuta* from the merest rudimentary knob. But these transition forms were entirely absent from Marendole, and of the *ansa lunata* only one specimen (No. 2) was found. On the other hand, the *cilindro-retta* handle (No. 3) was very abundant in Marendole, but rare in Arquà. It was also common in the terremare of Emilia and the eneolithic stations of the Romagna. Specially characteristic of Marendole were vases with projections like a beak or rostrum, hence called *rostrate* (Nos. 5 and 6). These were generally attached to low, wide-mouthed vessels, and often contained a small perforation in the upper part. Others assumed the form of a crest (Nos. 7, 8, 9); while others again had two openings, and hence their name, *ansa bilobata* (Nos. 10, 11). Three vases with bilobate handles are figured by Cordenons for comparison. One (No. 12) is from a wallburg at Sobunar, near Sarajevo; another (No. 13) is from a well-tomb at Corneto; and the third (No. 14) is from a tomb at Rome, said to belong to the same period as the Roman kings. For purposes of comparison I have figured some further illustrations of pottery from Bosnia, representing handles almost identical with those of Marendole (Pl. LVIII. (B)). Nos. 1 and 2 are from the wallburg in Sobunar, near Sarajevo (*Wissenschaftliche Mittheilungen aus Bosnien und der Hercegovina*, Band i., 42), the same prehistoric settlement from which Cordenons figures the vase with a bilobate handle on each side (No. 12). Nos. 3, 4, 5, and 6 are from *Marenkov Grad bei Kosutice* (*ibid.*, i., 118-9); No. 7 was found in a grave in Sanskimost (*ibid.*, vi., 79). All these Bosnian specimens of pottery were more or less associated with objects of the Iron Age. The striking similarity between them and those found at Marendole cannot be gainsaid, but their connecting link is not so patent. Cordenons has pointed out that these handles have been found on the other side of the Adriatic, in the so-called Castellieri of Istria, and accounts for this similarity on the supposition that the people of both districts were of the same race.

Stations in the Vicinity of Bologna.

We have already described a prehistoric station at Taranto which, in the opinion of Pigorini and other leading archæologists, must be regarded as a true terramara. If that settlement be the work of an offshoot from the terramara folk of the Po Valley, as is affirmed, it becomes a question of first-rate importance to determine how these colonists found their way there, for such a long distance could not be traversed without many halting-places by the way. In the vicinity of Bologna there are many hut-villages and other inhabited sites which have yielded much material representing the mixed civilisation now under review—a class of remains to which the late Professor Brizio devoted much of his time. Thus, for example, we find notices of two stations described as *terremare* (*Not. degli Scavi*, 1887, p. 387), one at Poggio della Gaggiola, and another on the mountain Santa Maria Villiana. The archæological remains found on the former were pronounced by Sig. Crespellani as “*perfettamente identici a quelli delle altre terremare dell’ Emilia*.” Among the relics found here was a primitive fibula of the violin-bow shape. But there is no mention of a surrounding rampart or traces of piles, probably the researches were not sufficient to determine its structural features. Above the terramara deposits there was a more modern stratum containing Etruscan remains similar to those of Marzabotto. Such a superposition was not rare among the stratigraphical deposits of the *terremare* of Emilia.

Brizio made a hurried visit to Santa Maria Villiana, and considered it to be analogous to the lower deposits of Poggio della Gaggiola. “The importance of this terramara” he writes, “consists in its position on a high mountain and its distance (50 kilometres) from Bologna” (*B.P.*, xiv., p. 38).

In addition to these sites and those already mentioned by Colini (p. 400), Mr Peet supplies the following details of an unrecorded station :—

“Even more important were the hut-foundations which Brizio excavated in 1906 outside the Saragozza gate. Owing to his death the material has never been published. The foundations were of the usual conchoid form, and appeared to be in two series, one above the other. The hearthstones still remained in

position in some of the huts. The material found included a number of bronze pins of terramara form and a large mass of pottery. The *ansa cilindro-retta* was very common indeed, as also was *ansa lunata*. . . . There are also several earthenware figures. Some are quadrupeds similar to those of the *terremare*, but a few represent birds with long necks, and are quite foreign to the *terremare*. Some of the pottery is ornamented with a combination of shallow, broad, grooving (*canalatura*) and circular depressions, a style found in the *terremare*." (*Loc. cit.*, p. 376.)

Trebbo Sei Vie.—In 1896 Professor Brizio (*Not. degli Scavi*, p. 61) described a recently discovered station at a place called "Trebbo Sei Vie," 4 kilometres from Castenaso, a small commune north-west of Bologna. The area occupied by this site was estimated at 400 by 200 metres. During the process of extracting fertilising materials the workmen picked up many

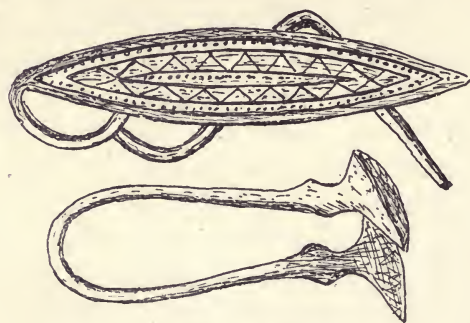


FIG. 165.—Leaf-shaped Fibula and Pair of Pincers, from Trebbo Sei Vie ($\frac{2}{3}$).

antiquarian relics, not a few of which were sent to the Archæological Museum at Bologna. Remains of huts were found on the surface of the original soil, but there was no evidence of a palafitte. A few flint objects were found, but they were described as of no importance. Fragments of eight handles of the *ansa lunata* and two of the *cilindro-retta* types were noted. The bronze relics included the upper half of a winged axe (*coltello ascia*), two ornamental pins, the lower portion of a double-edged razor, five blades of olive-leaf shape, with midrib—one with handle and blade in one piece. But the most novel objects in this fine collection were a pair of pincers and a leaf-shaped fibula (Fig. 165). On the chronological significance of these two relics Pigorini makes some pertinent remarks (*B.P.*, xxii., p. 252) in which he agrees with Brizio that these objects belong to the latest terramara period.

La Grotta del Farnè.—In 1882 Brizio published an elaborate account of excavations made during the previous year in the Grotta del Farnè, situated 11 kilometres south-east of Bologna (B. 130 (*bis*)). Important excavations were also made on more than one occasion by Sig. Francesco Orsi, the results of which were published in local journals (*La Patrie*, 1879, No. 207; *La Stella d'Italia*, 1881, Nos. 115 and 122; *Il presente* (Parma), 1890, No. 110). These various operations yielded a large assortment of archæological material, comprising objects of stone, bone, horn, terracotta, and bronze.

The entrance to the Grotta del Farnè lies 30 metres above the present level of the bed of the Zeno, and its interior extends to a length of 18 metres, with an average breadth of 8 metres.

Among the flints (some two hundred in number) were about twenty large roughly-worked specimens, which might have passed as Palæolithic implements. The others were mostly undefined flakes. Of stone there was one polished hammer of chloromelanite, to which is to be added, from the Orsi collection, the half of a perforated stone hammer (*B.P.*, xxii., p. 15). Also there were a few grinding-stones and portions of burnt-clay hearths.

Among the objects of bone and horn were daggers, pointers, needles, polishers, picks of deer-horn, etc. Interesting among these relics was a clay crucible still retaining on its inner surface particles of metal. Close to the cavern were found two flanged axes of bronze, precisely similar to those common in terramara deposits. That these axes belonged to the cave-dwellers is rendered more than probable by the finding of moulds for similar axes, as well as for knives, in the cave. In the Orsi collection Strobel mentions an oval object of bronze with two rivets, the use of which was unknown.

The pottery is admitted by all critics to be identical with that usually turned up on terramara sites. *Anse lunate*, *cornute*, *cilindro-rette*, and *ad ascia*, were all well represented. A few vessels were ornamented with incised lines forming zigzag groups of parallel lines and spirals. Professor Strobel, writing in 1890, thus expresses his opinion of the pottery:—"So far the specimens illustrated by Brizio, as well as those examined by me in the cavern, do not differ from the earthen-

ware of the terremare, either in the paste, the colour, the form, the handles, nor as regards any other character" (*B.P.*, xvi., p. 104). The same authority states that the great predominance of the osseous remains of domestic over those of wild animals favours the idea that the inhabitants of the Grotta del Farnè were terramaricoli—an opinion which he also advocates on archæological grounds. On the other hand, Brizio held that the terramara people were not new-comers into Italy, but the old Neolithic race (Liguri) in a more advanced stage of culture. Hence he looked upon the relics found on terramara sites, hut-foundations, and in caverns as belonging to one people, their technical differences being accounted for by the grade of culture in which their makers and owners lived.

Pragatto.—The station of Pragatto, distant 14 kilometres from Bologna and 5 from Bazzano, was discovered in 1879 by Sig. Antonio Zannoni, and described by him as measuring 200 by 150 metres, with accumulated culture débris amounting to 2 metres thick in the middle (*B.P.*, vii., p. 138). He informs us that the ceramic was precisely similar to that found on the terremare of Emilia and Castellaccio, near Imola, the *anse lunate*, both simple and ornamental, being abundant. The quantity of animal remains and the size of stag-horns he characterised as "extraordinary." Objects of bronze, piles, and wooden boards were not wanting. Zannoni also announced the existence close by of a cremation cemetery called Crespellano, which had just been described by Count Gozzadini (*B.* 125).

Brizio, some years later (*Not. d. Scavi*, 1888, p. 175) gives an account of further discoveries at Pragatto, consisting of a curious oval plaque of bone, 4 centimetres in diameter, and ornamented with a series of hollow dots; two circular discs of amber 2 centimetres in diameter, each perforated in the middle; an arrow-point hollow at the base, similar to those of Demorta, Vibrata, Polada, and the Mincio; a flint saw, a fragment of a polished stone axe of a green colour, and a lance-head of bronze. (*B.P.*, xiv., p. 136.)

It would be tedious to notice in detail all the settlements hitherto discovered and more or less explored, nor would the result give any additional weight to the archæological evidence,

as they are all so much alike. As their number and topographical distribution are, however, of importance in discussing the racial problem, we will describe a few stations along the supposed route of the terramaricoli on their southward journey.

Stations in the Neighbourhood of Imola and Forlì.

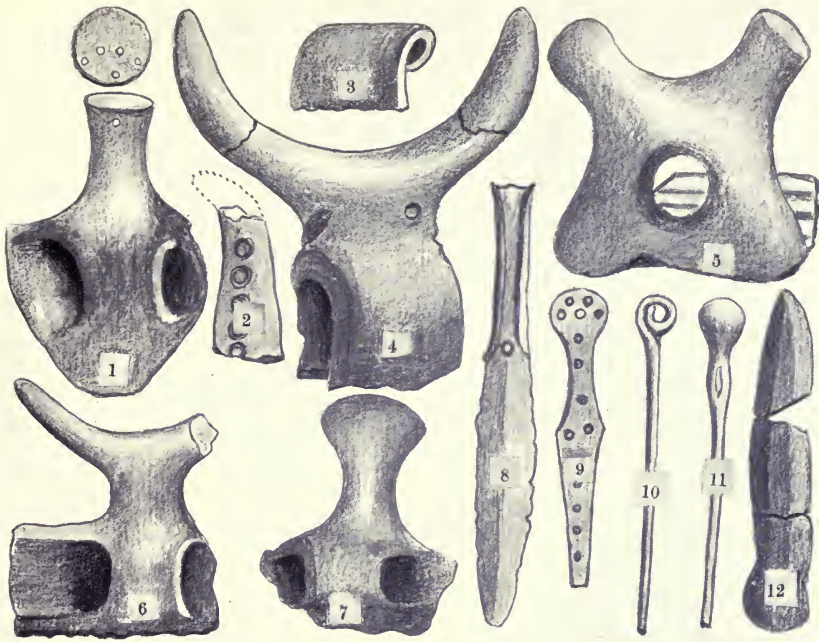
As we pass eastwards these hut-villages continue to disclose the same archæological features. In the vicinity of Imola are several sites which have been more or less explored. The best known are Monte Castellaccio (already described, pp. 332 and 339), Prevosta, and Toscanella. Prevosta is a village of hut-dwellings extending over an area of 20,000 square metres (Brizio, *Epoca Preistorica*). Twenty huts were examined and found to have been roughly circular, with diameters varying from 3 to 8 metres. According to Brizio all the pottery was of the usual terramara types, and among it were many *anse lunate*, besides the *cilindro-rette*, which were here classified into five distinct varieties. Toscanella, another station of the same kind, was discovered and explored (1892-1898) by Sig. Scarabelli, the investigator of Castellaccio. The material collected was deposited in the Archæological Museum of Bologna, but up to 1909 no report on these important relics had been published, except slight notices by Brizio in local journals. The site was quadrilateral in shape, and covered 16,888 square metres. The industrial products were for the most part identical with those of the *terremare*; but neither moat nor rampart was there, nor were the huts placed on a platform supported on piles, but on the earth. Colini (*B.P.*, xxxv., p. 140) mentions a few of the objects found on Toscanella—viz., a fibula of violin-bow shape; three bronze daggers, with blades in the form of an olive leaf; fragments of knives, swords, sickles, of terramara types; bone handles, ornamented with the dot and incised concentric circles, so well known among terramara objects; and finally, moulds for sickles, swords, knives, and pins. Mr Peet (*loc. cit.*, p. 379) mentions that in addition to the *anse lunate* and *cilindro-rette*, specimens of the Marendole handles were among the relics of this station. There were also some fragments of pottery showing

finely incised patterns, totally different from any hitherto found on the terramara sites in the Po Valley, but which are well known in stations further south.

Bertarina.—The hut-village of Bertarina di Vecchiazzano lies $2\frac{1}{2}$ kilometres south-east of Forlì, on a terrace of land in the angle formed by the junction of two streams. It was discovered in 1884 by Sig. Santarelli, and excavated at intervals, reports of which were duly published (B. 180). The general features of the station are as follows:—About 1.20 metres below the surface a deposit of dark earth, not exceeding half a metre thick, was encountered containing the usual débris of a hut-village. The hut-foundations were circular and only 1 to 1.30 metres in diameter. Surrounding these hut-foundations piles had been planted which apparently had been used for the construction of huts, the sockets of which only remained. Some of the piles were very large, measuring 15 to 30 centimetres in diameter.

The industrial remains disclosed the same technical facies as those at Castellaccio, the pottery and bronze objects being entirely of terramara types. A few of the objects are represented in Pl. LIX. (A), among them being specimens of both the *lunata* and *cilindro-retta* handles (Nos. 1, 4, 5-7). The usual two qualities of paste were used in the manufacture of the pottery, which was all hand-made, and burnt in an open fire. The bronze objects included a dagger-handle and blade in one piece—a weapon well known among terramara relics (No. 8); two pins, the top ends of which only are figured (Nos. 10 and 11); a small bone handle ornamented with dot and incised circle (No. 9). Neolithic objects were well represented, especially flint knives (No. 12). Among other objects were stone axes and a perforated hammer-axe, scrapers, flakes of obsidian, and pounding-stones.

As further evidence of the wide distribution of the *ansa lunata* or *cornuta*, I have figured on Pl. LIX. (B) (Nos. 12 and 13) two specimens from widely separated localities. The one (12) was found in 1877 while excavating the foundations of a house on the Esquiline Hill (*B.P.*, iv., p. 16). The other (13), now at the Museo Civico of Padua, is said to have been found among a quantity of pottery and bronzes from the ruins of



A.—Bertarina (Nos. 1-5, 8, 9 = $\frac{1}{8}$; 6, 7 = $\frac{3}{8}$; 10-12 = $\frac{3}{8}$. (After Santarelli.)



B.—Vibrata. (Nos. 1-5, 8-11 = $\frac{2}{8}$; 6 = $\frac{4}{8}$; 7 = $\frac{1}{2}$.)

Relics from Hut-foundations.

[To face p. 412.

Roman baths at S. Pietro Montagnon, in the Euganean hills—a district rich in antiquarian remains of all ages (*B.P.*, xxiii., tav. ix., No. 8).

Stations in the Marche and South Italy.

In the Marche there are several localities in which hut-villages have been found with archæological remains of the same character as those of Eastern Emilia. The sites recorded and more or less examined are those at Le Conelle, Crocefisso, Ponte del Goro, La Pieve, and the Grotta di Frasassi, all situated within the province of Ancona (*B.P.*, xxix., 81). Le Conelle lies 4 kilometres east of Arcevia, and the antiquities found on it have been described by Cav. A. Anselmi (*B.P.*, xviii., 94), and Brizio (*Not. d. Scavi*, 1891). They comprise arrow-points, fragments of vases, many *anse cornute* and *cilindro-rette*, two perforated stone hammers, stag-horn implements, and the handle of an awl ornamented with small incised circles. According to Brizio the pottery, both in its substance and ornamentation, was similar to that of the *terremare*. In 1894 two fragments of vases were found in this station having a novel ornamentation in the form of a rude head of a bird, with a bill like that of a duck (*B.P.*, xxi., 104).

Frasassi.—The cave of Frasassi is situated near Fabriano, at a height of 310 metres above sea-level. When discovered in 1872 it was ascertained to have an artificial deposit on its floor containing objects of antiquity, together with ashes, charcoal, and the bones of animals. It was observed on more careful examination that the archæological débris could be divided into two layers—an upper and a lower, the former containing Roman and more recent remains. With regard to the objects disinterred from the lower, opinion was divided, some regarding them as precisely similar to analogous remains in the *terremare*. But the excavations of Scarabelli in 1879 (*B.* 121 (*bis*)) settled the matter, as there could be no longer any doubt that industrial remains from the lower deposit of the cave were of the same mixed character as those emanating from the hut-villages of Eastern Emilia. This opinion

was subsequently confirmed by Brizio in an article in which he figured some fragments of pottery showing various forms of the *ansa lunata* (Pl. LX., Nos. 1-6). Among other relics of the cave-dwellers were spindle-whorls, loom-weights, and stag-horn implements. Pigorini has published a criticism on some of the "finds" from the lower stratum, in which he points out that three small cylindrical pieces of bronze proved on analysis to contain lead (with traces of iron and zinc)—a metal not hitherto known to be used as an alloy before the Iron Age (*B.P.*, xxi., 109).

From the above brief views of the antiquarian remains found on these hut-habitations and inhabited caves of northern and central Italy it is manifest that terramara civilisation was the dominating factor in the life of their occupants. We now, however, begin to meet with another class of relics which disclose, especially in the manufacture and ornamentation of their pottery, a style of art entirely foreign to that of the terramaricoli. This new element owed its origin to the native Neolithic people of south Italy, prior to the arrival of the Aryan races. It would appear that these two currents of civilisation overlapped to a considerable extent, the one moving southwards and the other northwards. The former seemed to have travelled farther from its original home as it reached both the Tyrrhenean and Ionian seas. The localities which have furnished these antiquities are hut-foundations in the Valle della Vibrata (Teramo). The Cavern of Felci, in the island of Capri, and that of Nicolucci, near Sarento, the rock-tombs of Matera, and the Grotta di Pertosa (Salerno). The last-named station presents the singularity of having had a palafitte erected over a torrent which traverses the cave.

The researches of the late Dr C. Rosa in the Valley of the Vibrata have for a long time attracted the attention of students of the past on account of the abundance and importance of the archæological materials they brought to light. The relics in question were collected from caverns (which appear to have served successively as dwellings and tombs), hut-foundations (of which no less than 336 were examined) and certain other sites which Dr Rosa regarded as workshops for the manufacture of stone implements. The larger portion



Frasassi (1-6), Vibrata (7-9), Pertosa (10-15), Nicolucci (16-23).
 (Nos. 1-6, 10-12, 16-19 = $\frac{1}{3}$; 13, 14, 20 = $\frac{1}{6}$; 21 = $\frac{2}{3}$; 24 = $\frac{2}{3}$; 22, 23 = about $\frac{1}{2}$.)

[To face p. 414.]



of this valuable collection is preserved in the *Museo Preistorico di Roma*, but a few objects have gone to the museums of Parma, Bologna, Reggio, Emilia, and to one or two others beyond the Alps. Professor Colini has now dealt with the whole of Dr Rosa's discoveries in a series of masterly articles (*B.P.*, 1906-1908), with copious illustrations of the more important objects and a map of the Valle della Vibrata (*B.P.*, xxvii., tav. ix.). From Dr Colini's wealth of photographic illustrations I have reproduced a few objects (Pl. LIX. (B)) which will give some idea of the culture of the people of this remarkable locality. These are, four daggers (Nos. 1-4) and one arrow-point of bronze (No. 5); a handle of a dish of the type *ad ascia* (No. 6); portion of a perforated stone used as the knob of a mace (No. 7); two arrow-points of the form known as rhomboidal (No. 8); and two of the ordinary type with a stem, but having a notch on one side (No. 9); a scraper (No. 10); and a slender borer (No. 11). Specimens of the south Italian pottery are given on Pl. LX., Nos. 7-9. The prehistoric remains of the Valle della Vibrata embraces almost all the phases of culture through which man has passed from the Chelléen epoch downwards.

Pertosa.—The Grotta di Pertosa is of singular interest on account of its palafitte and platform, said to have been constructed in accordance with the methods practised by the people of the terremare in the Po Valley. The pottery found in this cave was in a fragmentary condition, but out of the pieces several vessels were reconstructed, showing a variety of forms—flat basins, jugs, strainers, household buckets, etc. There was also a series of small vases, supposed to have been used for some ritual purpose. The ornamentation is both in relief and incised patterns. The former consists of knobs or raised bands marked with the finger-nail. The latter assumes various designs—the spiral, diamond-shaped space, and meander being the most common. These patterns were generally filled with punctured dots or lines containing a white substance. Among other relics of habitation were a handmill (upper and lower stones), two flint knives, together with a few articles of bone and horn. The only objects of bronze were a broken awl in a bone handle, and a flat axe with raised

edges, similar to the axes prevalent in terramara deposits. A few specimens of the pottery are given on Pl. LX., Nos. 10-15.

Nicolucci.—The Cave of Nicolucci, near Sarento, was explored in 1885 by Dr Riccardo Lorenzoni (B. 154 (e)). It contained a culture-bed (2 metres deep and covered over by a layer of stalagmite from 7 to 8 centimetres thick), in which pottery, stone implements, charcoal, teeth and bones of animals, and one object of bronze (No. 24) were found. Pottery was abundant, and though only five vessels were entire, the fragments—handles, ears, bottoms, etc.—gave a good idea of their form and ornamentation. A few are here figured (Pl. LX., Nos. 16-21). The paste appears to be of two qualities, and the ornamentation is either in incised lines or in relief. Cylindrical weights and spindle-whorls of terracotta (No. 20) were also among the collection, also some flint knives (No. 23), a few arrow-points (No. 22), two polished stone axes, sling-stones, a slender knife of obsidian, and a small object of steatite.

It is not my intention to enter on a detailed description of the antiquities of South Italian civilisation, beyond pointing out briefly in what respects they are differentiated from those of the *terremare*. From specimens of the pottery of the former (Pl. LX.) it will be seen that the elements of the ornamentation consist of simple patterns of incised lines, drawn with a free hand, in the form of zigzag bands, diamond-shaped spaces, squares, spirals, single and double meanders, etc. The spaces were often studded with punctured dots and the incised lines were generally filled with a white material, thus giving the design a pleasing appearance. In addition to these incised patterns there was another kind of ornament formed of bands and knobs in relief, often impressed with finger-nail marks.

Stray fragments of this pottery have been found as far north as the Ancona district, the station of Toscanella (Imolese), and the Grotta del Farnè (Bologna). It is interesting to note that this type of pottery has parallels on the other side of the Adriatic and in Crete. On the other hand, specimens of the *ansa lunata*, so characteristic of the *terremare*, have been found as far south as the Ionian and Tyrrhenean Seas.

Burial Customs.

Before concluding our sketch of the distribution of the culture and civilisation of the terramara people, a few remarks have to be made on the manner in which they disposed of their dead. For a long time the evidence on this point was somewhat uncertain, owing to the difficulty of associating any given interment or cemetery with a neighbouring terramara settlement; but since Pigorini's researches at Castellazzo, which, among other important results, included the discovery of two urn cemeteries close to the settlement, it is generally conceded that the terramaricoli cremated their dead. I am not aware of the publication of any detailed account of the contents of the Castellazzo cemeteries beyond the fact which we have already noted, viz., that one of them contained a platform supported on wooden piles, on which the urns with the cremated bones were closely set in rows. In the absence of this much desiderated information we have to fall back on a few of the instances hitherto brought forward in support of the opinion that the terramaricoli were cremationists.

Pragatto.—When Zannoni announced the discovery of the terramara at Pragatto, as already described (p. 410), he observed that its importance was enhanced by the fact, not hitherto well ascertained, viz., that to the east of Pragatto and not far from the terramara site, there had been lately discovered a vast cemetery which belonged to the people of that terramara (*B.P.*, vii., p. 138).

This cemetery, under the name of Crespellano, had been described by Count Gozzadini (*B.* 125), with two plates of illustrations. The vases were found from 60 to 70 centimetres below the surface of the land, and were sometimes placed one above the other; and so closely were they packed, that in a space 4.50 by 5.50 metres no less than two hundred and fifty vases were found. They stood with mouth upwards and were mostly covered by an inverted basin, as at Bovolone, Pietole, and Casinalbo. No relics were found with the incinerated bones. The dimensions of the cemetery were 40 by 10 metres, and, according to Gozzadini, it was in all other respects similar to those of Bovolone, Casinalbo, Monte Lonato, and Pietole.

Monte Lonato.—Sig. Antonio Bignotti, whose previous researches on Monte Lonato and the adjacent Monte della Pieve were suggestive of the existence of terramara settlements in the neighbourhood, discovered in 1876, on the plain near the former, a number of urn-burials (*Not. degli Scavi*, p. 75), which turned out to be a cremation cemetery covering about 400 square metres. The tombs were formed of stones arranged in circles covering the cinerary vases. Around the sites, and sometimes inside the vases, were fragments of pottery, some of which are represented on Plate LXI. (Nos. 3, 6, and 8), from which it will be seen that among them are *anse cornute*. Bronze was rarely found, only one piece having been identified, viz., a pin (No. 11), regarded as a characteristic relic of the terremare of Emilia. The vases were varied in form, but of the same types as were used in ordinary life. Many of them were destroyed by the plough, but a few typical specimens remain (*Not. Scavi*, 1878, tav. iii.), as figured on Plate LXI. Pigorini points out the close resemblance in point of decoration between the urns of Monte Lonato and some of those found in the cemetery of Bovolone. Every object in the cemetery points to its being of the Bronze Age.

Bovolone.—In 1876 some workmen while making a road near Bovolone, province of Verona, dug up several vases containing calcined human bones, of which thirty-six specimens were collected and placed in the Museo di Verona. Recognising the importance of this discovery, Professor Pigorini induced the Minister of Public Instruction to order a systematic investigation of the locality, under the well-known archæologist Cav. Stefano di Stefani. The result of his operations was the acquisition of another series of fine vases, which found a resting-place in the Museo Preistorico di Roma. The best-preserved specimens of this series have been described and figured by Pigorini, and their relation to other urns from terramara cemeteries have also been discussed (*B.P.*, vi., p. 182, tav. xii. and xiii.).

The urns of the first discovered group were 1.50 metres deep, but the later ones were only about .90 metre below the surface. They were apparently arranged in parallel rows, some standing in the midst of the remains of the pyre,



Monte Lonato. (Nos. 11 = $\frac{2}{3}$; 9 = $\frac{1}{6}$; all the rest = $\frac{2}{3}$). (After Bignotti.)



consisting of charcoal, ashes, and minute fragments of bone, which appeared to have been intentionally heaped around them. They were filled with calcined bones and simply deposited in the earth, mouth upwards, and were generally covered with an inverted basin. No worked objects were found inside these urns, and those in the surrounding earth were very few, merely a pointer made of the horn of a roebuck, and some fragments of pottery, including two handles of the *ansa cornuta* type. Bones and teeth of ox, horse, pig, stag, roebuck, and sheep were, however, of frequent occurrence. A noteworthy fact was that human skeletons extended in the bare earth were exposed, and judging from the decayed condition of the bones they were very ancient, but their precise relationship to the cremation cemetery was not determined.

In the absence of domestic pottery, and other features of burial, Pigorini did not think it a fair comparison to parallel the cinerary urns of Bovolone with the ceramic remains of the ordinary *terremare*, so that to determine their age he could only reply on their inherent characteristics and resemblance to other vases found elsewhere in analogous circumstances. Accordingly, he shows that there is a precise parallelism between the cinerary urns found at Bovolone, and those from Monte Lonato and Casinalbo. Also, he points out that the cemetery of Povegliano (Veronese), though the burials were by inhumation, belonged to the same age—an opinion which he formed from the number and variety of objects deposited with the bodies (*B.P.*, vi., p. 192). A few of the Bovolone urns are figured on Plate LXII. (Nos. 1 to 5).

Capezzato.—The cemetery of Capezzato, province of Parma, now forms part of the bed of the river Taro, and is only visible in the summer-time. In 1886 peasants began to find at the base of the bank, in a conspicuous bed of sticky soil, vases containing calcined bones. Reports of these discoveries induced Pigorini to visit the locality and make some investigation into the circumstances under which the urns were found, the result of which was published in 1890 (B. 158 (*c*) and 161 (*d*)). Correct measurements of the extent of the cemetery were not attainable, beyond the fact that interments extended for about 100 metres. Near the middle of this area the urns

were thickly set, with mouth upwards, but owing to the damage done by the river it was impossible to say whether they had been originally protected by any kind of covering. It was observed that some of the vases had a smaller urn inside, which also contained cremated bones (Pl. LXII., No. 9), and in a few instances these bones were protected by an inverted basin (No. 7). But none of the urns had relics among the bones, with the exception of one which contained a partially burnt wheel of horn, similar to those frequently found in the terramara settlements, and another which contained a whetstone. From the illustrations (Nos. 6-9) it will be seen that these ossuaries are of the ordinary terramara pottery, such as is used in everyday life. It may be observed that the absence of grave-goods is a feature common to all the cemeteries explored up to this date, viz., Crespellano, Monte Lonato, Pietole Vecchio, Bovolone, and Casinalbo.

Casinalbo.—The terramara of Casinalbo is situated 7 kilometres south-east of Modena, and like so many others of the kind, is surmounted by the village church. It has been long known to the peasants, being regularly excavated for its fertilising materials, and thus many valuable objects were discovered from time to time, some of which are now exhibited in the Municipal Museum of Modena. Among other objects so preserved are a socketed lance-head of bronze, and two stone moulds, one for a double-edged razor, and the other for a lance-head precisely similar to the one already in the Museum (*B.P.*, i., 35). Sig. Crespellani, writing in 1880 (*Scavi del Modenese*), informs us that the deposits were then nearly exhausted, and in order to preserve some record of so interesting a station, he made some inquiries as to its former dimensions of those who for twenty-six years helped to destroy it. It had a rectangular form, measuring about 200 metres in length (north to south), and 100 metres in breadth. It occupied a slight elevation, and had been surrounded by a ditch and a rampart. The cemetery, which occupies another small elevation on the opposite side of a canal, was discovered in 1880 (*B.P.*, vi., 76), at a distance of 200 metres south-west of the terramara. The urns were found about 80 centimetres below the present surface disposed in two layers, one above



Bovolone (1-5), Capezzato (6-9), Casinalbo (10-16). (Nos. 1-5 = $\frac{1}{6}$, the rest about $\frac{1}{3}$ real size.)
(After Pigorini and Crespellani.)



the other, and so close to each other that in a space of one square metre thirty were counted. They were simply deposited in the earth without any lateral support and covered over either with a flat stone or an inverted basin. There was no evidence of a pyre. The vases were hand-made, of two qualities of paste without a varnish, and burnt in an open fire. They were so fragile that most of them went into fragments on exposure, and for this reason, as Crespellani informs us, only some twenty specimens were preserved entire. A few of these are represented on Plate LXII. (Nos. 10-16). The handles and style of ornamentation are such as are commonly met with on terramara stations. The size of the cemetery, so far as could then be ascertained, was 50 metres in length by 30 metres in breadth. (*Scavi del Modenese*, 1880.)

Trinità.—In 1890 (*Scavi del Modenese*) Crespellani announced the discovery of several tombs belonging to the terramara of Trinità, in the province of Modena. They consisted of urns containing calcined bones but without any grave-goods, deposited in the earth, and having the mouth covered either with a flat stone or an inverted basin, similar to those discovered at Casinalbo.

Burial Customs of the Western Lake-dwellers.

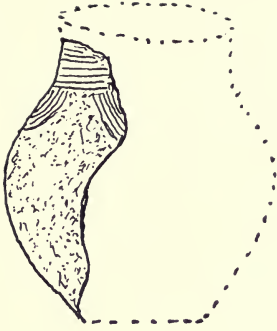
Glancing now for a moment at the western group of lake-dwellings, I find that the discoveries in that locality point to the same burial customs as were practised by the terramaricoli. To the careful researches of Professor Castelfranco of Milan we owe the few records that are available on this subject.

In 1879 Castelfranco (*B.P.*, v., p. 77) described the finding of a cinerary urn a few hundred metres north of Coarezza (Golasecca). The urn was of black earth without any ornamentation, and stood about 25 centimetres in height. It had been placed in the earth without any lateral support, and only a splinter of stone covering its mouth. It contained no accessory vase, but among the bones the following bronze articles were found—a dagger still retaining the rivet which fastened it to a handle (Pl. LXIII., No. 6), three bracelets (Nos. 1, 2, and 3), three rings (No. 4), a hairpin (No. 5), and two fragments of other two pins. Two years previous to the above

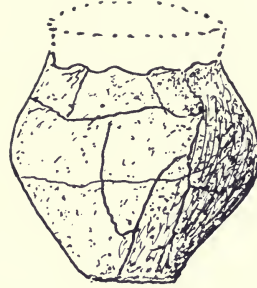
discovery (1875) a cinerary urn was turned up about 300 metres south-east of the present spot. It contained only calcined bones, and being broken to pieces was dispersed. Castelfranco assigns this interment to the transition period between the Bronze and Iron Ages. Writing in 1886, the same investigator directed attention to the discovery of urns containing bronzes with calcined human bones which was made, as early as 1868, at Cattabrega di Crescenzago, near Milan. The urns and their contents were dispersed at the time, with the exception of a flanged axe, two daggers or swords, with rivet-holes, evidently broken before being put into the urn, and a pin with a flat circular head ornamented above with concentric incised circles, and surmounted by a conical knob. This pin was also broken and contorted, apparently for ritual purposes. The shape of the urn, so far as could be judged from the evidence of an eye-witness, was like one found in the terramara cemetery of Crespellano, and that one had a biconical form (*B.P.*, xii., p. 57).

In the following year Castelfranco recurs to his interesting researches by recording information about the finding of an urn as early as 1861, at a place called Castellazzo, near Rogorea di Rogoreda (Brianza). The noteworthy peculiarity of this urn was that it was roughly polished, with a swelling in the middle, and contained among the calcined bones a knife-dagger (No. 12), and an ornamental pendant (No. 13). The latter is triangular in shape and ends with six teeth, said to be made with a file (*B.P.*, xiii., p. 138).

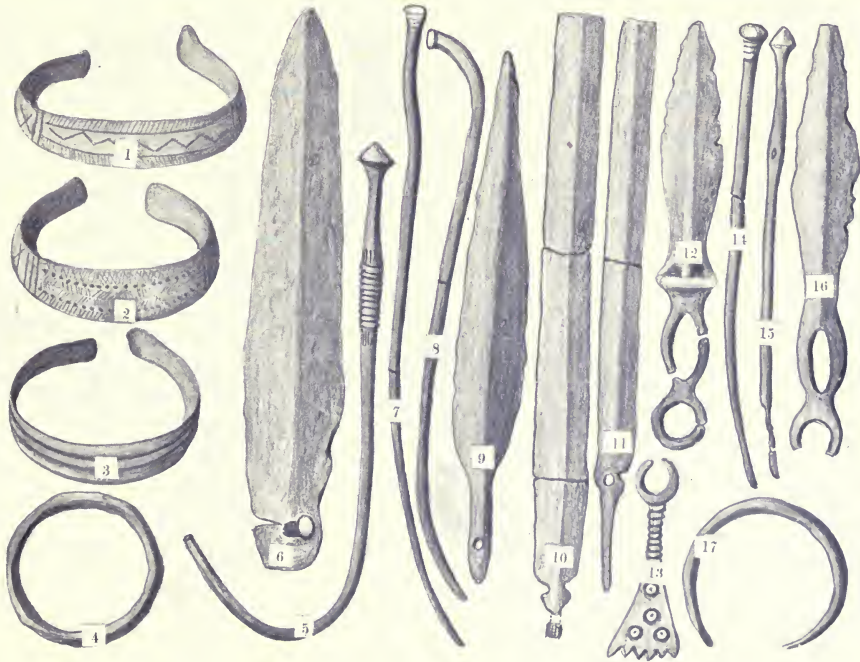
But perhaps the most instructive discovery of cremation burials brought to light in the western lake-dwelling area was that near Monza in 1888. A little to the north of this town, workmen while digging the foundations of a house came upon ten or twelve urns containing calcined bones. They lay about half a metre below the surface, disposed at intervals of about one metre along a sinuous line some 15 metres in length. The urns were of a dark colour, badly fired, and some of them contained bronze objects. The hope of securing treasure induced the workmen to continue the excavations during the night unknown to the proprietor, the consequence being that most of the urns and relics were dispersed.



A.—Urn, 13 inches in height.



B.—Urn, 11 inches in height.



Coarezza (1-6), Monza (7-11, 14-17), Rogorea di Rogoreda (12, 13). (All $\frac{1}{2}$ real size.)
(After Castelfranco.)



In 1889, about 300 metres north of this locality, other urns were uncovered under similar circumstances, one of which also contained various articles of bronze, and fortunately these were carefully preserved. In 1891 Castelfranco collected and published all the information he could gather about the Monza cemetery (*B.P.*, xvii., p. 34), from which these notes and illustrations are culled. Of the results of the 1888 excavations, only about a quarter of one urn (A) was preserved along with the following bronze relics found in more than one of them—two hairpins, a small dagger with an olive-leaf shaped blade and a perforated tang, two broken swords, of which three portions of each remain (Nos. 7-11). From the fragment of the urn preserved the vessel when complete would approximately measure 33 centimetres in height by 29 centimetres in diameter (Pl. LXIII., Fig. A).

During the excavations of the following year five or six urns were disinterred, which in technique were similar to the former. One on being partially restored indicated a height of 26 centimetres and a diameter of 28 centimetres (Pl. LXIII., Fig. B). It contained two hairpins, a razor and a penannular bracelet (Nos. 14-17).

The Racial Problem.

In describing the lake-dwellings of the Po Valley I stated at the outset that topographically they might be divided into an eastern and a western group. Professor Pigorini, however, believes that the difference between their respective cultures was greater than can be accounted for on mere topographical considerations, and hence he maintains that the inhabitants of these groups, though allied to each other by ties of common descent, had developed, in the course of time, so many divergencies in their social organisations that they have to be classified as two separate branches of the same people. He advocates the theory that the western lake-dwellers entered the country from Switzerland, while those of the eastern group came from the Danubian Valley by way of Hungary, Lower Austria, Croatia, and north-east Italy. The former immigrants founded their settlements along the lakes of Lombardy and Piedmont, spreading eastwards as far as the

river Chiese, and westwards to the peat-bog of Trana, a short distance beyond Turin. They did not, however, push their way to the south of the Po, and had, apparently, little communications with the eastern lake-dwellers and still less with the people of the *terremare* of Emilia. The eastern lake-dwellers occupied a portion of the province of Brescia and the provinces of Verona, Mantua, and Venetia. Observing that their industrial remains were almost identical with those of the *terramara* settlements of Emilia, Pigorini formulated the hypothesis that the *terramaricoli* were an offshoot of the Oriental invaders who crossed the Po, probably at a considerably later period, and founded their land palafittes on the plains of Emilia up to the foot of the sub-Appennine hills (*B.P.*, xiv., p. 124; xxix., p. 200). The relics collected on the site of the palafitte of Peschiera he regards as representing two chronologically distinct groups, one being identical with the *terramara* remains of the Bronze Age, while the other he assigns to the early Iron Age. He points out that the former can be paralleled with many of the antiquities found in the Danubian Valley; and that the presence of rye, amber, violin-bow fibulæ, and of some other objects common among the Iron Age groups but rarely to be found on *terramara* sites, shows that the lake-dwellers of Lake Garda were still in a flourishing condition during the early Iron Age. From the fact that these later relics were not strongly represented, he infers that the lacustrine settlements of Lake Garda were soon afterwards abandoned. From a very early period the *ansa lunata* was considered to be characteristic of the *terremare*; but the area of its distribution has now to be extended so as to include not only the regions occupied by the Oriental lake-dwellings and *terremare* of Emilia, but a number of hut-villages and cave-dwellings stretching along the slopes of the Adriatic, and reaching as far as the Ionian and Tyrrhenean Seas. Professor Orsi has shown that a rudimentary form of the *ansa lunata* was found as far north as the Cavern of Colombo di Mori (Trentino) (*B.P.*, viii., 183, tav. viii. 6). It is, however, very remarkable that while this singular form of handle to earthenware vessels has spread so far in the direction of north and south, not a single specimen has been found within the area

occupied by the western lake-dwellers. It appears to have acquired its artistic development among the Oriental lake-dwellers and terramaricoli. But, whatever may have been the motives which inspired its production, it must be admitted that its presence along with other relics characteristic of the terramara deposits, is presumptive evidence of the influence, if not of the personal contact, of the terramaricoli. Outside Italy specimens of its earlier forms have been found on prehistoric sites in Hungary and Bosnia, and sparingly in the lake-dwellings of Switzerland. Also, in Bohemia, Austria, Styria, etc., a fact which Pigorini claims as an argument in support of his theory of the origin of the Aryan immigrants into the Po Valley (*B.P.*, xv., p. 65).

During the Neolithic period, and prior to the incoming of the constructors of the palafittes, the Italian peninsula was inhabited by a dolichocephalic race, called Liguri or Ibero-Liguri, who lived in huts and caves, and disposed of their dead by inhumation. It has been proved that burial by cremation was practised by the terramaricoli and by both the eastern and western lake-dwellers, at least towards the end of the Bronze Age and beginning of the Iron Age; but whether they were cremationists on their first appearance in North Italy is a problem which has not yet been solved. Singular enough, the same uncertainty has been experienced with regard to the lake-dwellers of Central Europe. Some archæologists are inclined to exaggerate the importance of this question as a racial argument, on the plea that the manner of disposing of the dead would be hereditarily so rooted in the constitution that it would not be readily changed. But, as a matter of fact, the contrary is the case. Cremation, being the outcome of religious ideas, powerfully influenced humanity in those early days, and spread like wildfire throughout the whole of Europe, so that the change from inhumation to incineration might be accomplished among a large section of a community in a short space of time. Pigorini thinks that the lake-dwellers on settling in the Po Valley did not exterminate their Neolithic predecessors, who, accordingly, continued to live in their semi-subterranean huts and caverns, much the same as they were accustomed to; but no doubt imbibing some of the manners

and customs of the invaders. Subsequently towards the end of the Bronze Age a portion of the terramaricoli, to whom Pigorini gives the name of *Italici*, emigrated southwards, crossed the Apennines in two places into Tuscany and Latium, and ultimately founded Rome.

On the other hand, the late Professor Brizio stoutly maintained that the Liguri, *i.e.*, the dolichocephalic people of the Stone Age, who inhumed their dead generally in artificial caves or short cists, were the constructors of both lake-dwellings and terremare. The reason for giving up their semi-subterranean hut-dwellings for palafittes was to avoid the frequent floodings to which the low-lying regions of the Po Valley were subject. Lacustrine abodes were first begun in the Stone Age, and continued in vogue till the Umbrians and their civilisation spread over the land. Brizio also held that the Liguri gradually adopted the habit of cremating their dead, and that mixed burials were to be found in their cemeteries—an opinion which has not so far been justified by facts. The hut-villages, in which terramara relics predominated, he regarded as transition settlements, due to the influence of the Umbri of Bologna, also supposed to be foreigners of the Aryan race, who introduced iron into Italy. In support of his views he appeals to the close resemblance between the relics found on the hut-foundations and the terramara sites. But, if the people of these settlements were the same, it may be asked, why burial by inhumation has never been found in the cemeteries of the terramaricoli? Besides, no stage of transition can be detected between the two classes of relics. They are either full Neolithic or advanced Bronze Age types. Another potent objection against Brizio's views is, that if the Ibero-Liguri were the constructors of the terremare, why did they fortify them with a moat and a rampart? Who were their enemies? The essential difference between the theories of Pigorini and Brizio is simply this, that the former introduces on the scene a new race, the Italici, at the beginning of the Bronze Age; while the latter has recourse to the assistance of the Umbri, also a new race, at the end of that age.

In briefly reviewing the merits of these different theories I am inclined to the opinion—while agreeing with Pigorini in the

main problem, viz., that the palafittes of north Italy were primarily due to the incoming of a new race—that there was only one route by which the new-comers entered the country, and that was from the Danubian Valley, by way of Croatia, Carinthia, and north-east Italy. Possibly there were successive waves of minor invasions, each introducing some innovation in the manner of living. On reaching the Po Valley they founded settlements in Lakes Garda, Fimon, and Arquà, and others, during the transition period between the Stone and Bronze Ages. In the Lake of Garda the settlements were numerous, and some of them continued to be inhabited till the beginning of the Iron Age. The station of Peschiera seems to have been founded well on in the Bronze Age, but there were others at a much earlier period. In moving westwards these invaders followed the left bank of the Po, founding settlements in the intermediate lakes and marshes, until they reached the lakes of Varese and Maggiore, which formed their lacustrine headquarters in the western portion of the valley. This itinerary would account for the fact that relics of the Stone Age are found both in the eastern and western groups. In their early migrations the prehistoric peoples of Europe were guided by certain land-marks, especially the courses of flowing water. The lake-dwellers always followed the stream upwards, knowing that ultimately they would come upon some water-sheet suitable for their kind of life as hunters, pastoral farmers, and agriculturists. To suggest, therefore, that the lake-dwellings of Lombardy were constructed by a colony of the lake-dwellers of Switzerland coming across the Alps is a pure hypothesis, and a reversal of the natural order of primitive colonisation. On the other hand, those new-comers who settled in the eastern portion of the Po Valley began, in the course of time, to found palafittes on swampy grounds, the lakes in that district being insufficient, *i.e.*, too few and far between, for their agricultural and pastoral avocations. Subsequently they crossed to the south side of the Po, where, there being no lakes, but low-lying land subject to inundations, they continued their system of habitation, with the addition of a moat and rampart for defensive purposes. The crossing of the Po, which was really a great military event, is supposed to have taken

place near Viadana. Whether or not they were opposed by the Liguri is not ascertainable, but it is worthy of note that the great camp of Castellazzo was in Western Emilia, which would be on the frontier of the territory of the Liguri. This seems to me to have been the *raison d'être* for fortifying the terramara villages in that neighbourhood. On the east side, towards Bologna and the Adriatic, the hut-constructors were conquered and subjugated, and many of their villages became the sites of terramara habitations; but there was no necessity for fortifying them like those of Western Emilia. Pigorini's idea that the hut-villages along the eastern slopes of the Adriatic, admittedly containing remains of a civilisation which can only be distinguished from that of the terramaricoli by the presence of hut-foundations, were exclusively occupied by the Ibero-Liguri, seems to me inadequate to account for the facts. On this point I am constrained to differ both with him and Brizio. In my humble opinion the most rational explanation of the constant presence of this dual civilisation is that the terramaricoli in their migration southwards took possession of these native villages, and lived in their hut-habitations, finding them as comfortable as their own pile-structures. If there was an emigration of terramara folk from Emilia to south Italy, who ultimately became the actual founders of Rome, surely they must have left some traces of their journey behind them? If so, where are these traces? To me the answer is not far to seek: they are scattered along the Adriatic slopes in the numerous hut-villages and cave-dwellings, which are described as containing unquestioned remains of terramara civilisation. Nor can I endorse the idea that the terramaricoli were so rooted to the palafitte system that they could not dwell in huts placed on the ground, or half-buried in the earth like the "fondi di Capanne." The late Professor Strobel, in an earlier stage of terramara researches, protested against those who imagined that "the people of the *marière* and our *terremare* and pile-dwellings of the Bronze Age always and everywhere followed constantly one uniform and invariable order in arranging their abodes, as if they were inferior to the lower animals." (*Keller*, 2nd ed., p. 402.)

The cause of the almost sudden discontinuance of the

palafitte system of habitation, not only in Italy but all over central Europe, at the end of the Bronze Age is not known. We may, however, surmise that it was deep-seated, widely spread, and partly due to the law of the survival of the fittest, or its antithesis, the destruction of the unfittest. In the smaller lakes the growth of peat would make lacustrine habitations useless as a means of defence by burying them in peat, or converting their sites into accessible land-habitations. Of the settlements of the Po Valley the lake-dwellings of Lake Garda were the last to be abandoned, but the *terremare* ceased to be occupied by their owners at an earlier period, being found inadequate for the social and domestic wants of the successive races who subsequently dominated the Italian peninsula.

CHAPTER XVI

STRUCTURES ANALOGOUS TO TERREMARE IN OTHER EUROPEAN COUNTRIES

Introductory. Terpen of Holland. Warfen and Wurthen. Pile-structures in Hungary. The Neolithic Station of Butmir. Pile-structure at Ripac. The Pfahlbau of Donja Dolina. Concluding remarks.

IN quitting the Po Valley, with its interesting and varied remains of the lake-dwellings which formerly flourished in its water-basins, there is one prominent conclusion which must be borne in mind, as it is a legitimate result of practical investigations, and that is, that the *terremare* of Italy were a development of its lacustrine dwellings. We now proceed to inquire if structures analogous to the *terremare* of the Po Valley are to be found within the lake-dwelling area of Central Europe. The structural differences observed in the latter may be thus briefly described:—

(1) In all the larger lakes the true pile-system was adopted. This consisted of wooden piles driven vertically at regular distances into the bed of the lake, leaving their tops projecting at a uniform height above the level of the water. Transverse beams were then laid across and fastened to the tops of the upright piles, so as to form a platform capable of supporting the huts of a small community. In some instances, in order to firm and strengthen the supporting piles, quantities of stones were transported in boat-loads and thrown down around them. The result of these accumulations was to form submerged mounds on the bed of the lake, which are well known to modern fishermen under the name of *steinbergs*. These lacustrine villages were accessible by means of wooden gangways stretching between them and the shore.

(2) In the smaller lakes the pile-system was occasionally

superseded by solid foundations placed under each hut, as at Wauayl (*Lake-dwellings of Europe*, p. 78). Sometimes these under-structures were made large enough to accommodate several huts, as at Niederwyl and Schussenried (*ibid.*, pp. 118, 147). These basements were constructed of layers of round timbers laid transversely, and interspersed with brushwood, clay, stones, rushes, etc. Small uprights penetrated the mass here and there, the object of which was to keep the materials together. This was practically the method adopted in the construction of the Scoto-Irish crannogs, with the addition of being circular and surrounded by a stockade. The Glastonbury lake-village contained a number of huts resting on a somewhat irregular foundation, partly common to a group of huts and partly restricted to single huts. It agreed with the crannog type in being surrounded by a palisade.

(3) Another method was to erect a series of submerged wooden basements in the form of small rectangular compartments placed a few feet apart, the sides of which were formed of horizontal beams laid one above the other, like the logs in a Swiss chalet, but having their ends projecting for a few feet at the four corners. The lowest beams rested on the lake silt, and when the structure attained the requisite height above the water, the usual platform was laid across, and thus the empty spaces beneath became covered over. In the corners a few uprights were placed, apparently to keep the horizontal beams in position. This plan, probably adopted for economical reasons, as it saved material, was that generally practised by the founders of the sporadic lake-dwellings of the Iron Age, examples of which have been found in Lake Palagru in France, and in the lakes of Perzansig, Arys, Daber, and others in North Germany.

According to the latest researches in Lake Arquà Petrarca, it would appear that the Euganean lake-dwellers adopted all these different methods in the construction of their lacustrine habitations (see p. 396).

Associated and contemporary with these lake-dwellings in Central Europe, a few artificial islands, constructed after the crannog type, have been met with, as, for example, in the lakes of Inkwyl and Nussbaum in Switzerland, and Lake

Fuschil in Austria. But none of these types of lacustrine abodes can be paralleled with the specialised dwellings erected by the *terramaricoli*, and to find habitations analogous in structure to them we must go outside the domain of lacustrine pile-structures.

Archaic deposits are not infrequently met with in connection with inhabited sites which, from their composition and archæological contents, can scarcely be distinguished from the *débris* of the *terremare*. The only distinguishing and differentiating element is the presence of the remains of piles and other timbers which formed dwelling-huts. But the difficulty is to find evidence of such structures, as in ordinary circumstances all the woodwork utilised in the habitations of the Stone and Bronze Ages has completely disappeared by decomposition. In Egypt, with its very dry climate, wooden implements belonging to the earliest ages are found in excellent preservation, but in the variable climate which obtains in European countries woodwork rarely resists decay, except when situated in water or mud. Where the deposits are subject to be alternately dry and wet, decomposition takes place quickly. As regards the picturesque pile-villages that formerly studded the lakes of Central Europe, everything—huts, platforms, and even the submerged piles, except their lower ends—has succumbed to the gnawing tooth of time. The exploitation of the *terremare* in the Po Valley went on for years before the presence of piles became known, and even after that it took many years of practical research before their true meaning was ascertained.

The series of observations made by Chierici, which ultimately demonstrated that these settlements were pile-structures, is one of the most brilliant deductions ever recorded in archæological research.

The remains of human habitation found scattered throughout Europe, and which present so many points of resemblance to the *terremare* of the Po Valley that they fall to be discussed under this chapter, are the following :—

1. Certain ancient inhabited sites on the coasts of Holland and Western Germany, known as (a) *terpen*, (b) *warfen*, and (c) *wurthen*.

2. Some aqueous deposits in the Valley of the Danube, said to be pile-structures.
3. The Neolithic station of Butmir, in Bosnia.
4. The Pfahlbau of Ripac (Bosnia).
5. The Pfahlbau of Donja Dolina, on the bank of the Save (Bosnia).

1. (a) *Terpen (West Friesland)*.

Notwithstanding the striking and singular appearance the Swiss lake-dwellings must have presented to foreigners and strangers, it is a remarkable fact that Roman writers are entirely silent about them. Nor can this silence be accounted for on the supposition that the lake-dwellings had entirely come to an end prior to Roman times, as several of them have furnished antiquities the Roman origin of which cannot be mistaken. Some archæologists think they recognise in the representation of a Dacian village on the column of Trajan a true pile-village; but this is doubtful, and, even if true, it is but a very meagre evidence of the custom, and leaves the problem of the lake-dwellings as mysterious as ever. Such reticence on the part of classical writers does not, however, extend to the class of ancient remains I am now about to describe.

Pliny very distinctly states that the Chauci (Frisians and other races along the coast of the German Ocean) were in the habit of constructing artificial mounds, on which they built their houses, so as to be beyond the influence of the waves and tides. The following passage from his *Natural History*¹ will be read with interest in relation to the recent discoveries that have been made in the localities referred to:—

“I have myself personally witnessed the condition of the Chauci, both the Greater and the Lesser, situate in the regions of the far north. In these climates a vast tract of land, invaded twice each day and night by the overflowing waves of the ocean, opens a question that is eternally proposed to us by Nature, whether these regions are to be looked upon as belonging to the land, or whether as forming a portion of the sea?

“Here a wretched race is found, inhabiting either the more elevated spots of land, or else eminences artificially constructed, and of a height to which

¹ *Nat. Hist.*, lib. xvi., 1.

they know by experience that the highest tides will never reach. Here they pitch their cabins; and when the waves cover the surrounding country far and wide, like so many mariners on board ship are they; when, again, the tide recedes, their condition is that of so many shipwrecked men, and around their cottages they pursue the fishes as they make their escape with the receding tide. It is not their lot, like the adjoining nations, to keep any flocks for sustenance by their milk, nor even to maintain a warfare with wild beasts, every shrub even, being banished afar. With the sedge and the rushes of the marsh they make cords, and with these they weave the nets employed in the capture of the fish; they fashion the mud, too, with their hands, and drying it by the help of the winds more than of the sun, cook their food by its aid, and so warm their entrails, frozen as they are by the northern blasts; their only drink, too, is rainwater, which they collect in holes dug at the entrance of their abodes; and yet these nations, if this very day they were vanquished by the Roman people, would exclaim against being reduced to slavery! Be it so, then—Fortune is most kind to many, just when she means to punish them.”

Notwithstanding the preciseness of Pliny's description and the fact that for several centuries, since the great sea-dykes were erected, the scattered remains of these mounds have been accessible on dry land, they have only quite recently attracted the attention of archæologists. I consider their investigation important, not only for the large amount of industrial remains they contain, but for supplying a missing link in the evidence of continuity in the European habit of constructing pile-dwellings.

Before the construction of the great sea-dykes in Holland nearly the whole of West Friesland would have been in that hybrid condition described by Pliny, in which it was difficult to say whether it belonged to sea or land (*dubiumque terræ sit, an pars maris*). At the present time, however, these lands are richly cultivated, and look as if they were a dead level. It is only on close inspection that the monotony is relieved by certain elevations of considerable extent called *terpen*, whose summits rise to about the level of the larger dykes. These mounds are situated at more or less regular intervals, so that if the tides by any calamity had free scope, they would appear as so many islands scattered over the country. It is on such elevations that modern churches and villages are generally built, and, till they accidentally attracted the attention of agriculturists, nobody seemed to think anything about their origin. A few years ago it was discovered that their interior

was composed of a rich ammoniacal deposit which agriculturists found valuable as a fertilising agent when spread over their fields. The excavation of this substance for manuring purposes now forms an important industry, and any landed proprietor who happens to own a workable terp—*i.e.*, one free of buildings—is on the way to realise a small fortune. When a terp is found suitable for being excavated they generally commence by digging a canal close up to its base, sufficiently large to admit of the passage of good-sized boats. The boats are then easily loaded with the stuff, and so it is conveyed to all parts of the country. As the workings advance the canal is also advanced, so that the boats are always in close proximity to the diggings. In the course of these operations, bones and horns of various animals, pottery, and other relics of human industry were occasionally turned up.

Mr Dirks, president of the Friesch Genootschap, as early as 1871 characterised these mounds as analogous to the terramara beds of North Italy—*ce sont des terramares historiques* (*C.A.P.*, 1871, p. 212); but it remained to Professor Pigorini of Rome to show that they were identical as regards internal structure. This he did in 1881 (B. 129 (c)), after a visit to one at Aalzum which was then being excavated, when he showed that there was a circumscribing dyke, and, although no actual piles were then visible, he was informed by the proprietors that such wooden structures had been occasionally met with. Prior to his visit, it appears that no special attention was directed to these structural remains. From all he could learn, however, on this point, and especially from a consideration of the stratified arrangements of the débris, Pigorini concluded that the deposits were due to pile-dwellings, and had accumulated under precisely similar conditions to the terremare, in regard to which he is such a distinguished authority.

During the summer of 1888 the terp at Aalzum was being systematically excavated, and, though only partially cleared off, the results, from an archæological point of view, were of considerable importance. Moreover, the excavations were conducted on an extensive scale, and the locality is readily accessible. I can, therefore, conceive no better means of con-

veying to you some knowledge of the nature and structural phenomena of these remarkable deposits, than by detailing the facts which came under my own cognisance during a visit I then made to the Aalzum mound, under the guidance of Mr Battaerd, then conservator of the Friesch Genootschap Museum, and recorded in my *Lake-dwellings of Europe*, p. 336.

“The terp lies about 1 mile to the north of the town of Dokkum, some 12 miles from Leeuwarden, and 4 or 5 miles from the sea-shore. In approaching the locality from Dokkum there was little to attract special notice beyond the usual Dutch scenery—canals, rich meadows, herds of splendid cattle, and here and there some well-cultivated cornfields. In front of us a slight elevation could be discerned, crowned by a small church in the midst of a clump of trees, the surroundings of which were neatly hedged meadows and cornfields. As we advanced towards this church, and within a few hundred yards of it, we entered on a sloping road, as if raised on a dyke, but on each side the land was perfectly flat and bearing a splendid crop: here a field of magnificent beans, and there an equally promising one of wheat. These fields, said Mr Battaerd, were formerly part of the terp-mound from which the fertilising stuff had already been removed, but this road was left undisturbed, so that we are now actually walking on a portion of its surface. By and by we came in sight of heaps of clayey stuff, the tops of which sparkled with reflected light, and in their midst were to be seen the masts and rigging of three boats. Those whitish clay-like heaps, said Mr Battaerd, formed the surface soil, which, being of no commercial value, had to be wheeled off before the saleable deposits could be got at. At last the actual workings were reached, and we found ourselves in front of a perpendicular section some 15 or 18 feet high, from which men and women were busily engaged in loading the boats. Uppermost in my thoughts was the paramount question of the existence of upright piles, which, it will be remembered, Pigorini had not actually seen. Great was my delight when, at the very first glance, my eye detected an undoubted pile of oak just in face of the cutting. Close by it I soon found another, and as we moved along numbers were observed, some soft and yielding, scarcely offering any resist-

ance to the spade ; and others of oak very hard in the centre, but more decayed and ragged-like than those I have been in the habit of seeing among the lake-dwelling remains. Those seen in this section differed considerably in size ; and I observed that some penetrated deeper than others. At a little distance lay a heap of oak beams which had recently been removed from the trenches—one of which I measured and found it to be 4 yards in length, and from 6 to 8 inches thick. Upon inquiry, I ascertained that these beams lay horizontally, and about half-way down, in the stratified stuff.

“ While wandering amidst the various sections presented by the progressive stages of the excavations, wondering at the distinctness of the strata, or picking up stray objects from the débris, such as mussel-shells, bits of bone, fragments of pottery, etc., which were to be found here and there sticking in the face of the cuttings, my friend, Mr Battaerd, was deeply occupied in examining a heap of bones, which lay weathering in a sunny corner. Having joined him in his osteological study, I found that the chief point of attraction was the head of a urus (*Bos primigenius*) of great size, and with splendid horn cores—the finest example, according to Mr Battaerd, that had yet found its way to the museum.

“ The land close to the brink of the section, and extending over a considerable portion of the mound, was occupied by growing corn, and hence its dimensions can only be approximately stated. The proprietors, Messrs W. and J. Bierma, obligingly accompanied us, and one of them assured me it could not be less than from 300 to 400 yards in diameter. Its greatest height above the water in the canal was 18 feet, but of course the level of the canal water is considerably lower than that of high tide in the open sea. The commercially valuable stuff commenced some 3 or 4 feet below the surface, and continued without interruption to within a few feet of the canal water. It was in this intermediate portion that the relics were found: but their exact position, especially that of the smaller objects, was seldom determined, as it was generally after the stuff had become partially broken up during transport that they were found.

“ The stuff *in situ* was distinctly stratified, forming layers of

various thicknesses, from a finger-breadth up to 3 or 4 inches, or sometimes more, which in some instances could be continuously traced for long distances. Sometimes they shelved out altogether, and others commenced. Here, a bed of fibrinous matter, in which quantities of the partly decomposed fibres of flax could be readily recognisable; there, a thickish deposit of brownish glutinous stuff like peat. Charcoal and ashes permeated the whole, and showed themselves sometimes as distinct layers. Clay and sand were also largely mixed with these deposits, and occasionally assumed the form of distinct and separate beds.

“Having so far satisfied ourselves as to the structural arrangements of the mound, and the disposition of its contents, we walked up to the church, which is but a short distance from the workings. This small edifice is surrounded by a burying-ground, and among the gravestones are some ancient-looking ones. Mr Battaerd informed me that it dates as far back as the eleventh century.”

The *modus operandi* in the construction of a terp appears to have been as follows:—First a circular mound of mud was raised during ebb-tide. When this ring was sufficiently elevated to keep the waves outside, platforms supported on wooden piles were erected within the enclosed area on which the dwelling-huts were placed; and as the rubbish accumulated and filled the underspaces, the process was repeated until the interior of the mud-ring became a solid mound. Some of the terpen were found to be intersected by marine strata, showing that occasionally the waves broke the circumscribing mud-wall and made havoc of the interior.

In 1888 it was calculated that there were about one hundred and fifty of these mounds in West Friesland alone. But recent researches have shown that this estimate was far too low (see p. 442). They are also to be found in the province of Groningen and some other parts of Holland. Dr Dirks states that the town of Leeuwarden is built over two terp mounds (*C.A.P.*, 1871, p. 212); and Dr Pleyte informed me that he has reason to believe that the town of Leyden also reposes on similar deposits.

Relics.—The relics of human industry collected from the

terpen are very varied and numerous. Of these the following notes and illustrations, taken chiefly from the large assortment in the Leeuwarden Museum, will serve to convey some general idea of the social economy which prevailed among the occupiers of these singular settlements, as well as of the period in which they flourished.

Prehistoric.—The prehistoric remains, commonly so-called, such as cutting implements of stone, are only feebly represented, but occasionally they do turn up as survivals of a previous civilisation, in which respect the terpen resemble the Scottish and Irish crannogs.

Clay Objects.—Perforated loom-weights, both conical and flat; spindle-whorls in great numbers, and often ornamented with finger-marks or grooved lines (Pl. LXIV., Nos. 2, 3). Some flat and triangularly-shaped objects of clay (No. 22) are perforated with three holes, one at each angle, which are sometimes perpendicular and sometimes parallel to the surface; in bulk and composition they correspond with the loom-weights.

Pottery.—Pottery is, as a rule, coarse but abundant, and represents vessels of various shapes and sizes, generally with ears, but a few with handles (Nos. 20 and 23). Samian ware is represented by many fragments of bowls and dishes. A few vases, apparently home-made, have some traces of coloured patches; and there are lids with raised handles and ornamented with hollowed dots.

Bone and Horn.—Bone and horn implements are very abundant, consisting of combs (Nos. 1 and 16-19) of varied forms, and constructed of plates riveted together with iron rivets, and ornamented with consecutive circles, lines, dots, and curvilinear figures; among them are also a few combs with very long teeth (No. 30). There are also pins (Nos. 26 and 28), needles (No. 29), buttons (No. 25), dice (No. 21), finger-rings (No. 12), knife-handles, pointers, etc. (Nos. 10, 11, 13, and 27). Many skates, made from the long bone of the horse's leg. Two or three short bones (foot of the ox) are covered with concentric circles, apparently for ornamentation. A curious bone object (No. 7) is supposed to have been used in making twine or ropes.

Glass.—Beads, blue, green, and variegated ; also glass slag.

Metal Objects.—A few bronze dishes (No. 5), one a tripod with projecting handle (No. 15). Figurines of men and animals ; the hand of a Roman statue, apparently a female and about full size ; Roman fibulæ ; some three or four double spirals ; a small pair of shears (No. 8), a few bracelets with clasping-hooks and a comb (No. 14) are of bronze. Among objects of iron are shears, hammers, bridle-bits, slag, etc. A leaden bar or pig weighing 17 kilogrammes, and marked with three crosses, so, "xxx," was found at Achlum.

Coins.—Anglo-Saxon coins very abundant : at Hallum 180 sceattas were found in a jar ; Byzantine money in gold ; Roman imperial money, generally in silver, but sometimes in gold ; Frankish coins. The proprietors of Aalzum found a few silver coins in this terp with the following inscription : " + HLOTHARIVS. IMP. DORE STATVS MON (*eta*)," which defines their date to be between 840 and 855 A.D.¹

Wooden Objects.—Small spades precisely similar to those used by children while amusing themselves by digging the sand on the sea-shore. Numbers of large casks, the staves of which are kept together by three iron hoops. In diameter these casks are not more than an ordinary herring-barrel, but in length they are from 6 to 7 feet, and about one-third from the top there is a small square hole 4 or 5 inches in diameter. The ends of the staves at the top rim of some are much decayed, but the rest is perfectly sound, and for this reason they are supposed to have stood in water with only the upper parts exposed. They have been found in almost all the terpen examined, usually at regular distances, and deeply buried. One, 6 feet high, was found resting inside a vat 3 feet deep, and its highest point was over 2 yards below the surface of the mound. Canoes and small paddles may also be mentioned as occasional relics.

Nondescript Objects.—Cock - spurs ; egg - shells of the domestic fowl and goose, some of which, singularly enough, were, when found, still unbroken ; shells of various kinds of sea-urchins, starfishes, and mussels ; amber beads, also this material in the unworked form ; amorphous vivianite ; large

¹ *Handelingen van het Friesch Genootschap*, 1886-7, p. 12.



Terpen and Pile-structures on the Coasts of Holland and Germany.

(Nos. 24 = $\frac{1}{3}$; 12, 21, 27, 29 = $\frac{2}{3}$; and the rest = $\frac{1}{2}$ real size.)



quantities of the débris of flax; one curious object is a flute made of the shank-bone of a small animal; one small fictile dish has four feet, and a few others are in the form of three cups attached. At Aalzum, on the occasion of my visit, among the articles purchased by Mr Battaerd were a mitten and some sort of head-dress like a felt wide-awake. The mitten had only one stall, for the thumb.

In the terp called Beetgum there was found an urn, like those from the dolmens of the Drenthe, containing some burnt bones. Human bones are sometimes found, but they are supposed to have belonged to secondary burials. At Aalzum a grave was found containing a body, and along with it was a fibula of the Merovingian period, with a flat back containing a beautiful mosaic pattern of variegated glass and amber.

Fauna.—Osseous remains representing the following animals:—Horse, ox (several varieties—*Bos taurus*, *primigenius*, *longifrons*, *brevicornis*), cat, dog, sheep, wild boar, deer, roe, and fallow-deer. Among the skulls of these animals (of which there are many) are one or two of the four-horned sheep. It may be of interest to note that the osseous remains of this animal were among those identified by Sir W. R. Wilde as coming from the crannog of Lagore.

Recent researches.—As the excavation of the terpen is prosecuted solely in the interest of agriculture, little attention is being paid to the position of the archæological treasures they contain. Either a canal, or a railway siding, is conducted to the perpendicular facing of the mound, and from it the transporting boats or waggons are filled. Most of the larger relics are thus encountered, but many of the smaller ones, such as beads, fibulæ, combs, coins, etc., escape observation. From the objects thus picked up the Curator of the Leeuwarden Museum has the privilege of selecting any he thinks necessary for the national collection. But these relics convey little information as to their stratigraphical position, or associated remains, and they are therefore of little use in estimating the chronological range of the inhabited sites. As these valuable sources of archæological information are rapidly disappearing, Mr P. C. A. J. Boeles, curator of the Friesch Museum at Leeuwarden, has recently undertaken

a critical examination of the large and interesting collection of their remains under his charge, with the view of classifying them in chronological sequence. The first instalment of his labours in this direction appeared in 1906, under the title of *Die Friesche Terpen*. This brochure has been translated into French by M. G. Cumont, and published in the *Annales de la Société d'Anthropologie de Bruxelles*, vol. xxi. (1907). From these pamphlets may be gathered a few details bearing on the history and chronological range of the terpen, in addition to those already given, which merit a brief notice.

From a map of the geographical distribution of the terpen, recently issued by Friesch Genootschap, it appears that their total number in Friesland amounts to five hundred and seventy, but as sometimes a terp has two names, M. Boeles reduces their number on that ground to *circa* 500, of which two hundred have already been excavated. Of the remaining three hundred many are not available for either agricultural or archæological purposes, being occupied by villages, churches, cemeteries, etc. Owing to the method of extracting the fertilised material, there is seldom an opportunity of obtaining a connected view of their internal structures. That the débris of habitation is mostly stratified has long been observed. When I visited the terp at Aalzum in 1888, as already described, I noticed not only regularly stratified beds but several upright piles in the facing *in situ*. On this point M. Cumont thus writes:—
 “L'étude méthodique de tout un tertre comme celui d'Hoogebeintum entraînerait de si grands frais que le budget de la Société frisonne d'archéologie n'y suffirait pas, mais M. Boeles a eu la chance de pouvoir constater, pour la première fois, quelques faits intéressants. C'est ainsi que de châssis de bois placés horizontalement ont été observés dans plusieurs tertres, et il est maintenant certain que ces châssis ont été construits pour raffermir le terrain où des puits ont été creusés. M. Boeles a vu trois de ces châssis superposés. Les puits dont l'âge a pu être déterminé datent de l'époque Carlovingienne.” (*Les Terpen de La Frise*, 1907, p. 7.)

In some instances the débris of habitation is met with as

low as the Friesch summer water-level (*Zomerpeil*), and it is difficult to suppose that on this level huts would have been erected on the ground without some kind of wooden structure, where, otherwise, they would be liable to be flooded by any sudden alteration in the ordinary level of the tides. That the origin of some of these habitations dates to pre-Roman times is evident from Pliny's description of them, but the actual date is still a matter of controversy. These are some of the problems which induced M. Boeles to investigate the matter on the principles of comparative archaeology. Besides the largest assortment of materials in the Leeuwarden and Groningen Museums at his disposal, the terp at Hoogeteintum, which was then being excavated, afforded him an excellent opportunity for studying its special features. The terp of Hoogeteintum lies 19 kilometres north of the town of Leeuwarden, and is the largest and highest known, having a diameter of 250 metres, and a height of 11.35 metres. During the year 1905 the proprietor began to excavate it on a larger scale, when evidence of the existence of a cemetery on the south side came to light, in a greyish clay, different from the black earthy substance which yields the usual fragments of pottery, bones, ashes, and other débris of habitation. Here were found a number of urns and human skeletons. The latter were sometimes enclosed in coffins made of the hollowed trunks of trees, and sometimes in wooden boxes. Others, however, were without any covering, being merely placed on a pallet of grass or straw. M. Boeles regarded the cinerary urns, which were hand-made, as of Saxon origin, dating from the fifth or sixth century A.D. But there were a few wheel-made urns, which he considered to be the work of the Franks, as the wheel was not used in Friesland, either by the Saxons or Frisians, till the tenth or eleventh century.

In classifying the terpen antiquities M. Boeles ascertained that among them there were none of the Bronze Age—a fact which also held good for those in the Groningen Museum. This observation is all the more significant because Bronze Age antiquities are found elsewhere in various parts of Friesland, and consequently he justly argues that the terpen

are posterior to that age. Mr Pleyte had already observed that the terpen of Westergo had yielded some objects which appeared to belong to a civilisation older than either that of the Romans or Frisians (*Nederlandsche Oudheden*, p. 42). Professor Pigorini, on the other hand, came to the conclusion that the terpen belonged to the second period of the Iron Age, *i.e.* several centuries after the Christian era.

As early as 1901, M. Boeles observed some fibulæ of La Tène types among the Leeuwarden Collection, and after studying them carefully, as well as others in the Groningen Museum, he has shown that specimens of the three types into which La Tène fibulæ are divided are among terpen remains. As these La Tène fibulæ have a precise chronological value, they give a date to some of the terp habitations as early as 400 B.C., and downwards to the incoming of Roman civilisation into Friesland, in the first century A.D. The La Tène fibulæ were then supplanted by Roman types, mostly derivatives of the former, and by those of later peoples—Saxons, Franks, and Merovingians.

M. Boeles mentions in his annual report on the acquisitions to the museum from the terpen for the year 1911, that some interesting specimens of Roman pottery (*terra sigillata*) had been received, including several fragments with makers' marks. Besides, there were also Roman tiles, a beautiful figure of bronze representing Mars, (from the terp at Tzum), and a Merovingian hanging ornament of gold from the Dekema terp at Cornjum.

It may be inferred from these remarks that the system of terp habitation commenced a few centuries before the Christian era, and that it continued without interruption to about the twelfth century. Also, that the archæological contents of the débris of occupation, when scientifically interpreted, represent the successive changes in the culture and civilisation of their inhabitants. M. Boeles is on the right track in bringing to light and sorting these most valuable elements for the illustration of the proto-historic period in this quarter of Europe. But the task is by no means a light one, for, in addition to a comparative analysis of the antiquarian objects belonging respectively to Frisians, Celts, Romans,

Saxons, Franks, Merovingians, and Carolingians, the remains of the contemporary flora and fauna have to be similarly examined and reported on by experts.

(b) *Warfen (East Friesland)*.

In 1879 Dr Tergast, of Emden, published a short account of the prehistoric antiquities of East Friesland,¹ in which he takes notice of the existence of certain mounds, in the low-lying regions, called "warfen," which he believes to be the remains of very ancient settlements constructed for the protection of their inhabitants against floods and the fluctuations of the surrounding waters. The author does not give many details about these mounds. It would appear, however, that they are to be met with in considerable numbers, as he suggests that it would be of the highest interest to archæological science to have a map constructed showing their local distribution. Nor do they appear to have been subjected to much practical investigation, as only three objects from them are illustrated in Dr Tergast's book. These are a bone implement, either a skate or cloth-polisher, a necklace of glass and amber beads, and an iron arrow-point. He also figures a comb (6 inches long) similar to that from the terpen (Pl. LXIV., No. 30), but without specifying the locality where it was found. All these are precisely similar to objects found in the terp-mounds of Holland. Every indication, therefore, points to the conclusion that the terpen and warfen are quite analogous to each other and belong to the same period of time.

(c) *Wurthen (Dithmarschen)*.

In 1883 Dr Hartmann, of Marne,² gave a more detailed account of similar dwellings in the Holstein fen-district, near the embouchure of the river Elbe. These, in the form of low mounds, are met with, according to him, in all the marshes along this part of the North Sea coast. In the Dithmarschen, both north and south, they are very numerous, and the larger ones, like the terp-mounds of Holland, are now generally occupied by one or more modern buildings. In extent they

¹ *Die heidnischen Alterthümer Ostfrieslands*, Emden, 1879.

² *Ueber die alten Dithmarschen Wurthen und ihren Packwerkbau*, Marne, 1883.

vary from $1\frac{1}{4}$ to 15 acres, and in height from 13 to 23 feet above ordinary mean tides. On several occasions in recent times, in the course of excavating the foundations of new buildings, the digging of wells, etc., various relics, such as fragments of pottery, clay weights, iron implements, bits of manipulated stag-horns, broken bones, etc., were turned out, which, however, suggested nothing more than passing comments. But their real nature is now clearly shown by the facts recorded by Dr Hartmann, the chief of which were ascertained from excavations conducted by himself in the Fahrstedter Wurth, situated some three miles to the north of the Elbe. This wurth, some years ago, became the property of a brick manufacturer of the name of Huesmann, who was in the habit, from time to time, of utilising its contents, partly for filling up old clay-pits and partly for manuring purposes. Such was the condition of the Fahrstedter Wurth when Dr Hartmann's attention was directed to it in August 1881. On his first visit, while poking about the open trenches, he picked up, at a depth of 4 feet from the surface, a perforated clay weight, 4 inches in diameter, and $2\frac{1}{2}$ inches thick. After this he continued his visits to the locality regularly, and in a short time collected a number of relics, besides determining many interesting points in regard to the structure of the mound. The greatest depth reached by the haphazard excavations of Mr Huesmann was $9\frac{1}{2}$ feet. Along the exposed section down to this point Dr Hartmann distinguished the following layers:—

- | | |
|--|----------------------|
| 1. Ordinary soil (<i>Ackererde</i>) | about 2 feet. |
| 2. Greenish sandy earth (<i>hellgrüne sandige Erde</i>), supposed to be due to sea action, from the fact of its containing many of the spicules or needles of sponges | 1 " |
| 3. A layer of reddish clay (<i>rother Estrich</i>) | $\frac{1}{2}$ to 1 " |
| 4. Remains of wooden structures (<i>Packwerk</i>) | 2 to 4 " |
| 5. Earth mixed with clay (<i>helle Kleierde</i>) | $1\frac{1}{2}$ " |

This packwerk is described as made up of decomposed branches, from the size of a finger to, occasionally, the thickness of an arm, arranged horizontally, but sometimes perpendicularly. Its lower portion was composed of large quantities of the twigs of birch and oak, the fibres of several

marsh plants, broken bones, and other organic débris. In the underlying clay he noticed some holes, which he concluded to have been due to small piles, the wood of which had disappeared by decomposition. Scattered through this packwerk were found, besides charcoal and ashes, a varied assortment of the relics of human industry, of which the following may be noted :—Fragments of pottery (grey and black), among which were some with perforations round the rims; sharpening-stones; a perforated clay weight; twelve portions of quern stones, made of basalt, and having a thickness of $1\frac{1}{2}$ to $2\frac{1}{2}$ inches—from a fragment, the entire diameter of one was ascertained to be 17 inches; several iron knives, a socketed lance-head, and some nails, together with lumps of both iron and glass slag. A wooden handle, some worked objects of bone with marks of rivets, bits of birch-bark, etc. A black mass of asphalt, supposed to be a product of birch-bark, had embedded in it the shell of a hazel-nut. From this it was inferred that the mass was originally in a fluid condition.

Among the osseous remains the following animals were identified by Dr Pfeffer, of the Natural History Museum at Hamburg, and Dr Rautenburg:—dog, ox, pig, sheep, stag, horse, bittern (?), and sturgeon (recognised by its scales).

In the clay below the packwerk (*Kleierde*) were found the stumps of eight piles, 5 to 6 feet apart, which Dr Hartmann concluded had originally passed upwards through the fascine work, but now only the portions embedded in the clay remained, the rest having disappeared by decomposition. Of these piles (four oak, three birch, and one ash), some were round and some rectangular, and nearly all more or less pointed at the lower extremity. The exceptions were blunt, and rested on some fragments of granite stones. One of the piles, which measured 6 inches broad and $2\frac{3}{4}$ inches thick, contained four round holes, in one of which a portion of a spar still remained.

Having satisfied himself as to the condition of this portion of the mound already exposed, Dr Hartmann got permission from the proprietor to sink a shaft into the undisturbed portion underneath. The superficial area of this shaft was 12 feet long and 9 broad, and it was excavated until the sea-sand was

reached, at a depth of $11\frac{1}{2}$ feet—*i.e.* about 21 feet from the surface of the mound.

Continuing now our inspection of this section (the upper portion of which I have already detailed) the following layers were successively passed through:—

| | |
|--|----------------------|
| 6. Clay earth continued | $1\frac{1}{2}$ feet. |
| 7. Packwerk (No. 2) | 1 „ |
| 8. Blackish clayey stuff (<i>dunkle Kleierde</i>) | 1 „ |
| 9. Light clay (containing the stumps of a second series of piles, four in number, and from 3 to $5\frac{1}{2}$ inches thick) | 1 „ |
| 10. Packwerk (No. 3) | 3 „ |
| 11. Whitish clay, mixed with twigs, branches, reeds, etc. | 2 „ |
| 12. A layer of cowdung (<i>Grüngelblicher fester Kuhdünger</i>) | 2 „ |
| 13. Sea-sand (<i>Meeressand</i>) | |

The two packwerke here encountered are stated to be similar to the first, and the relics are also much of the same character. The under portion of both is described as being made up of twigs of oak, birch, and hazel, very much birch-bark, worked bits of wood, wooden handles of tools, burnt faggots, débris of marsh plants (*Schilf, Binsen, und Samen von Polygonum*), small bundles of bast and other fibres of fine roots, shells of hazel-nuts, fragments of pottery (6 lbs.), lumps of iron slag (5 lbs.), broken bones (16 lbs.), charcoal, a piece of red-stone, and the shells of some edible molluscs (*Helix fruticum* and *Strigella*, and *Cardium edule*).

Among the relics to be noted are a spindle-whorl, an iron buckle, and a bit of leather.

Of special interest is a third series of piles, which he describes as terminating in the sea-sand underneath all. These piles were five in number, four oak and one birch, 2 to $5\frac{1}{2}$ inches in thickness, and 18 to 33 inches in length. They were placed in a zigzag fashion about $1\frac{1}{2}$ foot apart, and traced through the layer of “kuhdünger” to the “packwerk,” where they became so rotten as to be no longer recognised. One of them had also a hole, which still retained a portion of a projecting spar.

Our investigator made observations, but of a much more limited character, on nine other wurthen, and in all of them he found the “packwerk” to be a special feature in their structure.

Such is an epitome of the facts on which Dr Hartmann bases his opinion that not only the wurthen, but also the neighbouring warfen and terpen, were constructed like the fascine islands of prehistoric Switzerland, and the Scottish and Irish crannogs. The idea of pile-buildings can scarcely be entertained by him, and he stoutly combats Pigorini's opinions in regard to the terpen of West Friesland.

The Fahrstedter Wurth, according to Hartmann, consisted of an original mound some 7 feet high, to which on two subsequent occasions additions were made. The initiatory process of its construction was to form a basis of kuhdünger 2 feet in thickness. Over this clay and rubbish were placed, to the extent of over 2 feet; and then came the fascine structures, which raised the mound other 3 feet. To keep the mass together, piles were driven here and there down to the sandy bottom. But the inhabitants soon found that this was too low to shelter them from the waves and floods, so they constructed an addition to their mound, which raised its surface to 10 feet. But this was not enough, and so a third addition was made, which added 6 feet more to the mound. At this height its surface would be about 20 feet above sea-level (*Normal Null*), and at this height Dr Hartmann concludes that cottages would be quite secure, as the highest tides on record—viz., 4th February 1825—reached only 12 feet 4 inches above the medium sea-level, a result which would leave a considerable margin for the Fahrstedter Wurth. Of course, the tides never reach it now, as it is protected by the sea-dykes, the first of which was constructed in the middle of the twelfth century.

Very little reflection shows the inherent improbability of Dr Hartmann's theory. Where could the primitive builders get such a quantity of "kuhdünger" to start with? If the "packwerk" was constructed as a solid mass, how could its under portions be so prolific of such varied relics, and other odds and ends of human occupancy? Moreover, the disproportion between the original and final height of the mound is incompatible with the supposition that the successive increases were merely additions entailed by unforeseen circumstances, such as an unusual storm. The three platforms with their corresponding series of upright piles, the stratified assortment

of the structural materials, and the position of the relics and débris of its inhabitants scattered throughout the entire mound, are, in my opinion, inexplicable on any other hypothesis than that we have here the remains of pile-dwellings, successively erected one above the other, precisely similar to the *terremare* of the Po Valley, as already described.

2. *Pile-structures in Hungary.*

On the right bank of the Theiss, a few miles from the railway station of Szolnok, and near the village of Tószeg, there is an artificial mound called "Kuczorgó, or Lapos-halom," to which, since the meeting of the International Congress at Buda-Pesth in 1876, much importance is attached, on account of the opinion expressed by Pigorini that it is identical in structure with the *terramara* mounds of Northern Italy. The mound, though now considerably undermined by the river Theiss during the great floods of 1876, is still of considerable extent, measuring some 360 metres in length, and 100 metres in breadth, and rising to a maximum height of 8 metres over the surrounding plain. It is only in times of flood that the waters reach the mound, its usual bed being about $1\frac{1}{2}$ miles distant. When the artificial nature of this mound became known by the section exposed by the floods, some extensive investigations were made to determine its archæological character. The objects collected in these researches were exhibited at the Congress as a special find, and among them were the following (Catalogue, pp. 85-87):—

(1) Perforated hammers of stag-horn, various pointed implements of horn and bone, perforated teeth of pigs, and a leg-bone perforated in two places, probably a skate.

(2) Polished stone celts and perforated hammers, four flint flakes, and one of obsidian, corn-crushers, and various other worked stones.

(3) Fragment of a bronze pin, a bronze knife, and a small ingot of bronze.

(4) Pottery, showing a variety of dishes, some with handles, etc.; various objects of burnt clay, as a whistle, buttons, a spoon, eighteen pyramidal clay weights (perforated), etc.

(5) A considerable amount of food-refuse, as bones, scales of fish, shells, charred wheat, etc.

When the International Congress was held at Buda-Pesth, Pigorini, Virchow, and Miss Mestorf visited this mound and made some further researches, which not only confirmed Pigorini in his suspicions about the structure of the mound, but also led his distinguished fellow-investigators to accept the main portion of his theory. Upon their return home they¹ published separate accounts of this excursion to Tószeg and the results obtained, from which I must here be content to notice that the following propositions are admitted as facts:—

(1) The existence of piles and wooden beams was satisfactorily proved, and Pigorini asserts that these corresponded with three different levels, precisely as they occur in the terramara mounds.

(2) The materials containing the débris of occupancy were distinctly stratified, forming parallel or undulating layers, amounting to a total thickness of 4 metres.

(3) The antiquities collected represented all ages, including stone celts, bronze and iron implements, and a skate made of the leg-bone of a horse.

Subsequently Dr Romer gave an account of the excavations conducted at Tószeg previous to the meeting of the International Congress, in an article entitled "Les Terramares en Hongrie," along with which he describes similar deposits at other places, as Nagy-Rév, Szelevény, Keményteto, and Asott-halom. In regard to the latter station, he remarks that rotten piles were observed in its lowest stratum before Pigorini called attention to their importance. Some of the objects from Asott-halom were exhibited at the Congress (see Catalogue, p. 44), and included polished stone axes and hammers, flakes of obsidian, perforated hammers of stag-horn, etc. The author concludes his article by stating that the terramara deposits are by no means confined to the valley of the Tisza, as they have already been observed in various other low-lying districts along the Danube, Garam, etc. (*C.A.P.*, 1876, vol. ii., p. 18.)

¹ Pigorini, B. 101 (e); Virchow, B. 95; Mestorf, *Der Intern. Anthropol. und Arch. Cong. in Buda-Pesth.*

3. *The Neolithic Station of Butmir.*

Recognising the importance of the numerous discoveries which have been made in the field of prehistoric research since the establishment of the Bosnisch-Herzegowinisches Museum and its staff of experts, the Government invited a number of archæologists and anthropologists to visit Sarajevo, for the purpose of examining and pronouncing an opinion on the antiquities already brought to light, and by this means to make their archæological value better known throughout the scientific world.

This Congress was held during the week, from the 15th to the 21st August 1894, and included among its members a number of well-known European archæologists. Of the twenty-six gentlemen invited, the following accepted the invitation:—Dr Otto Benndorf, Vienna; Dr Eugen Bormann, Vienna; Dr Edmond von Fellenberg, Berne; Dr Joseph Hampel, Buda-Pesth; Dr Jakob Hierli, Zurich; Dr Oscar Montelius, Stockholm; Professor Gabriel de Mortillet, Paris; Dr Robert Munro, Edinburgh; Professor Luigi Pigorini, Rome; Julius E. Pisko, vice-consul, Janina; Dr Johannes Ranke, Munich; M. Solomon Reinach, Paris; Herr Josef Szombathy, Vienna; Dr R. Verneau, Paris; Professor Rudolf Virchow, Berlin; Dr Albert Voss, Berlin. These sixteen gentlemen, together with Dr Moriz Hoernes, Vienna (secretary), and the local men, chiefly officials of the museum—viz., Messrs Horman (director), von Thallóczy, Radimsky, Fiala, Patsch, Truhelka, Glück, Reiser, Apfelbeck, Weisbach, and Ballif—constituted the Congress.

The actual business of the Congress was begun at nine on the morning of the 16th August, when Baron Appel cordially thanked the strangers for coming so far to take part in the investigation of the antiquities of Bosnia and Herzegovina. Afterwards the members were invited to adjourn to the museum to inspect a special group of antiquities of the Stone Age, consisting of an immense quantity and variety of fragments of pottery, flint and stone implements, arrow-heads, scrapers, tools, etc., arranged by Berghauptmann Radimsky in one of the rooms of the ground floor, as in the afternoon the

locality where these objects had been found was to be visited. The excavations which yielded this assortment of early relics were still conducted by Radimsky, at a place called Butmir, in the vicinity of Ilidze. The fertile plain of Ilidze, which occupies a wide basin, some 11 kilometres long by 7 broad, has been formed by the débris of streams and rain-washed materials from the surrounding hills. The river Bosna, the main branch of which suddenly springs out of the ground some 2 miles to the south of Butmir, is virtually formed by the junction of a number of streams meandering through the

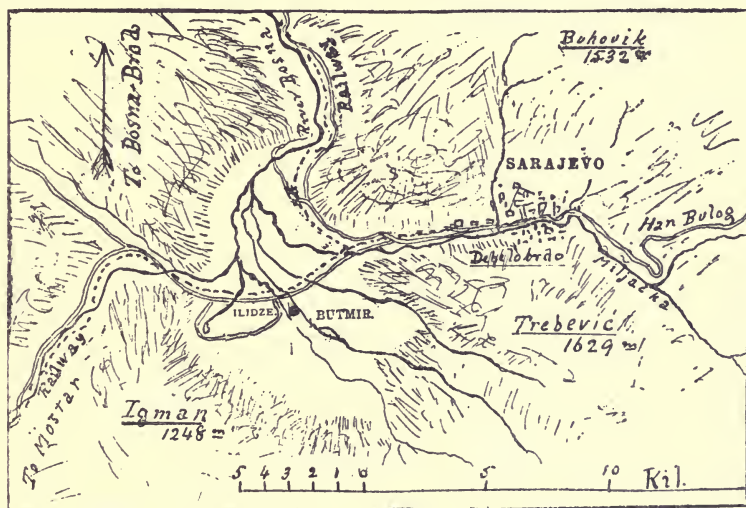


FIG. 166.—Plan of District around Butmir.

plain from different directions (Fig. 166). In earlier times it is probable that this basin was more or less a lake; and indeed, in winter, portions of it still become submerged. Almost in the centre of this plain, and only separated from the grounds of the modern baths of Ilidze by the sluggish water of one of these streams, there is a portion of land covering several acres which on careful inspection is seen to be a little more elevated than the part of the plain in its immediate proximity. This elevation was selected by the Government as the site of offices for a model agricultural farm; and when, in 1893, excavations for these buildings were begun, it was discovered that all this raised area was composed of the refuse of early human occu-

pany. Part of this prehistoric settlement, or workshop as some suppose it to have been, is now occupied by a large dairy and other buildings, but the larger portion of it is simply arable land and could be readily excavated at any time.

From a study of the accompanying plan (Fig. 167) it will be seen that the outline of the settlement is an irregular oval, measuring 185 metres in length, and 155 metres in its greatest

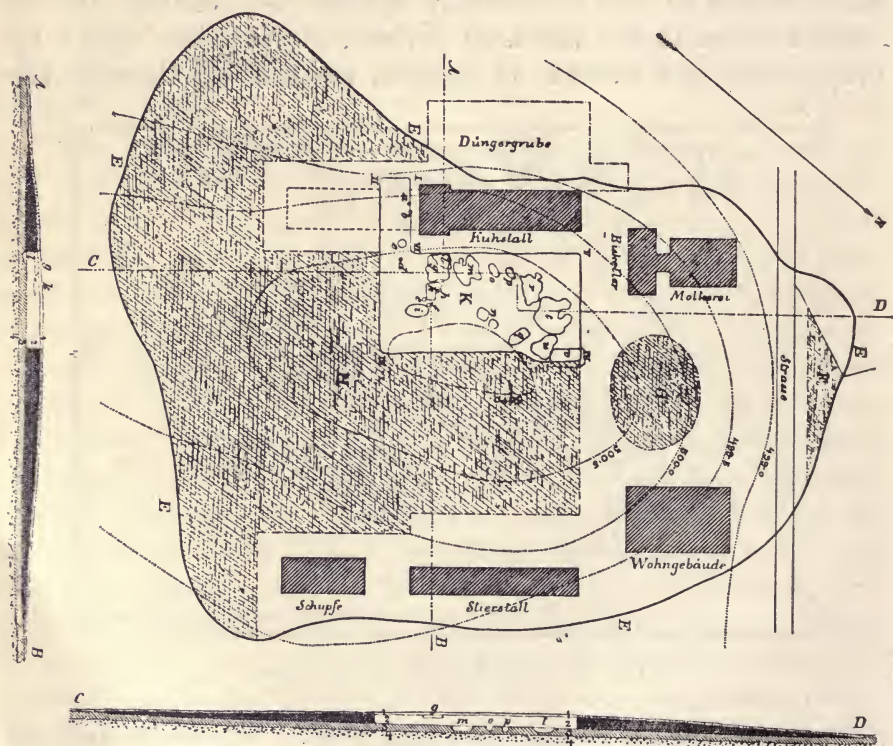


FIG. 167.—Plan and sections of the Neolithic Station of Butmir.

breadth. Its superficial area is 19,170 square metres (about 5 acres), and its average height above the surrounding plain 2 metres. Of this area, 1356 square metres have been excavated and 9280 square metres still remained untouched but capable of being excavated, the rest being occupied with buildings, roads, etc.

The above brief sketch gives a general idea of the situation and environment of the Neolithic station of Butmir, to which the members were now conducted. A perpendicular section,

showing the nature and position of the materials of which the elevation was composed, had been previously prepared; and Mr Radimsky, who superintended the excavations, was there to explain the details of what had already been done. His Excellency Minister von Kallay with Frau von Kallay, and a number of visitors from Sarajevo and the hotels of Ilidze, were present, and watched the eager disputations of the savants with much interest, if not even amusement—for no sooner had the section (Pl. LXV. (A)) been scanned than a difference of opinion as to the nature of the settlement became manifest among them.

The perpendicular section showed the following deposits arranged in successive beds from above downwards:—

First, 12 to 16 inches of clayey soil; secondly, a blackish streaky mixture of clay, mould, charcoal, etc., arranged in strata more or less parallel. The depth of this heterogeneous mass was from 3 to 5 feet; and it was in it, dispersed apparently throughout its entire contents regardless of depth, that all the relics were found. Beneath this again was a natural bed of fine yellowish clay, very adhesive and homogeneous, and acknowledged by all to have been the virgin soil before the relic-bed had been deposited. I may observe that there was no clearly defined line of demarcation between the relic-bed and the virgin clay, as bits of charcoal were frequently to be seen embedded in the former to a depth of several inches. The discovery of occasional hollows in the underlying clay (Pl. LXVI.) suggested to Mr Radimsky the idea that they were the foundations of the original huts of its inhabitants, and that in the course of time the débris had so accumulated as to force them to build from time to time new huts at higher levels.

Radimsky's theory of this settlement was generally adopted by the members of Congress, with the exception of Professor Pigorini and myself, who argued that the entire phenomena, especially the stratification of the *Culturschichte*, could only be explained on the supposition that the huts stood on raised platforms supported by wooden piles, and that the food-refuse, together with the lost and worn-out implements had gradually accumulated in the vacant space underneath. Hence the

"find" at Butmir became the subject of an animated controversy at the congressional sederunt next day. Pigorini opened the discussion by a long speech, in which he advocated that there was a precise analogy between the deposits of Butmir and those of the *terremare* of Italy. The principal objection to this theory was the absence of piles, of which hitherto not a trace had been observed, nor, indeed, of any wood whatever.

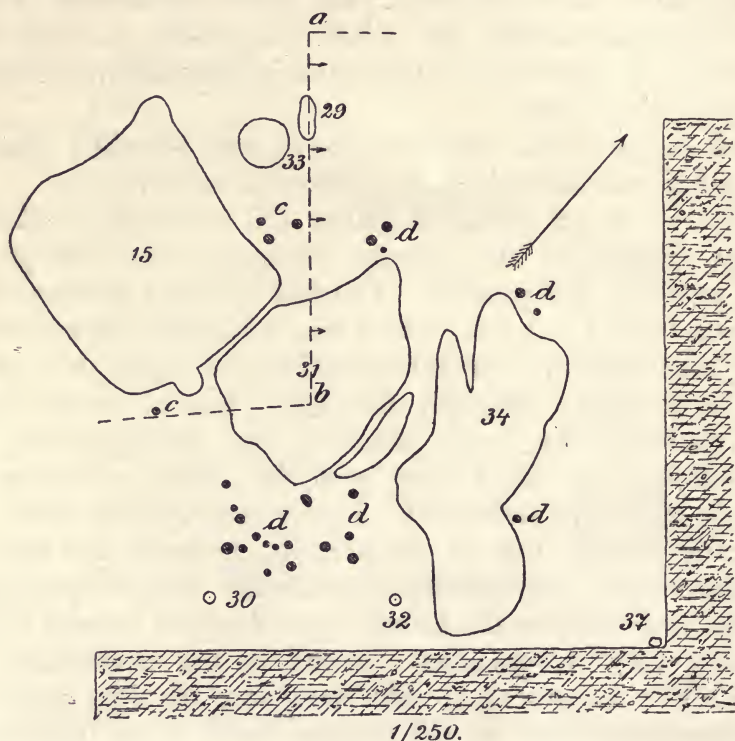


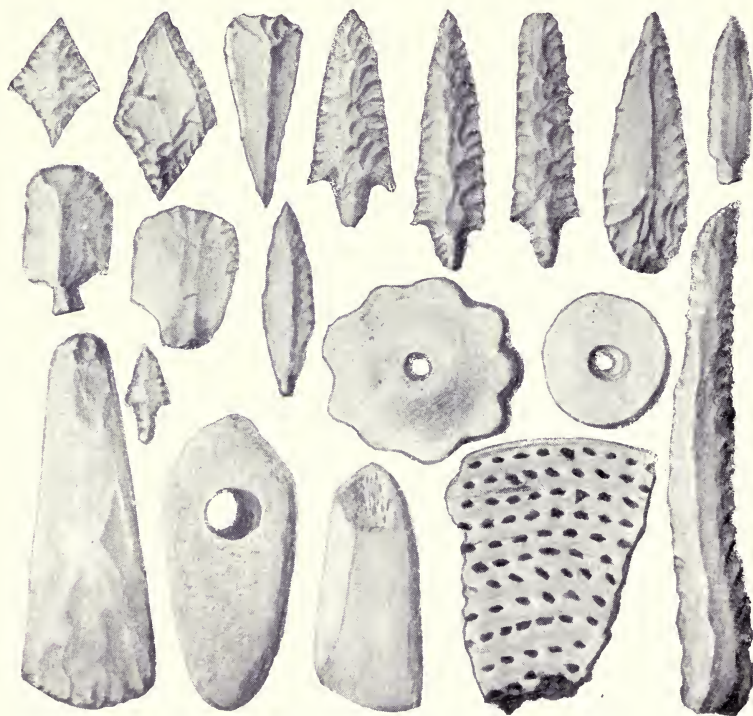
FIG. 168.—Showing the supposed Foundations of three Huts (Nos. 15, 31, 34), and the position of Pile-holes (*d*).

In offering a probable explanation of the absence of piles, I ventured to point out that although the actual piles were not now to be seen, all the woodwork having completely decayed, traces of the holes in which they stood might be found—a fact which was clearly established on the next visit by the discovery of several round holes (Fig. 168), one nearly 10 inches in diameter, penetrating into the underlying clay. On section these holes were seen to have become filled with clay, charcoal, bits of pottery, etc. But, of course, it had yet to be proved





A.—Members of Congress inspecting the Excavations at Butmir, 16th August 1894.



B.—Flint and other objects found at Butmir.

Butmir. Excavations and some Relics.



Excavations at Butmir, showing Clay Pits.



that the wooden uprights which had formed these holes had been part of a general system of pile-buildings. The transverse sections of these pile-holes varied greatly in size, but it did not follow from this that the original piles were in accordance with the different dimensions thus disclosed. The circular area occupied by a pointed stake would depend on the extent to which it had been driven into the clay. If near the tip the hole would be less than if it had gone further down.

In reply to Professor Pigorini's theory, Mr Radimsky made a lucid statement of the facts he had observed, and the grounds on which he based his opinion that the settlement was not of the nature of a pile-structure. He contended that the huts, to begin with, had been placed on the actual clay lying underneath the relic-bed—which at that time would be the natural surface of the ground—while those subsequently constructed would be placed at higher levels, gradually rising in the strata in proportion to the age of the settlement and the amount of *débris* which had accumulated in the interval.

In order to test Pigorini's theory it was agreed to run a trench out beyond the margin of the mound, in order to ascertain if it had been surrounded by a dyke and a ditch, as was almost invariably the case with the *terremare* of Western Emilia.

With regard to what took place at the meeting of Congress, I have merely to say that the opinion so ably set forth by Radimsky had the effect of influencing the majority of members to adopt his views. This outcome to the discussion was greatly strengthened when a few days later it became known that the execution of the trench showed that there had been no circumvallation of the deposits at Butmir—no trace of either dyke or ditch having been found. It would appear that this result was regarded by some of the members as a final settlement of the question at issue.¹ But it is unnecessary here to dwell on the opinions and arguments advanced at the

¹ Professor Pigorini on returning from Mostar again visited the excavations, and afterwards wrote to me that he had abandoned the idea that there had been a dyke surrounding the settlement at Butmir. Mr Radimsky also wrote to the effect that Pigorini now agreed with him that Butmir was not a *terramara* but a *Landansiedlung*. A similar announcement was made to Professor Virchow, who reiterated it a few days later at an Archæological Congress at Innsbruck.

Congress with regard to the structural details of the settlement, as we have now more precise information on the points at issue than could be gathered from anything then said. This additional source of evidence consists of a magnificently illustrated monograph (*Die Neolitische Station von Butmir*) in two parts, issued respectively in 1895 and in 1898. The work is the joint production of Dr Moriz Hoernes, who writes introductory notices, and of Radimsky and Franz Fiala, who describe the excavations and the objects collected in the débris. The first portion of the work deals with the results obtained by the excavations conducted in 1893, and the second with those of 1894, 1895, and 1896. This brings the investigations at Butmir to an end, as no further digging can be carried on without interfering with the buildings already built on the site.¹

Shortly after the appearance of the first portion of the monograph I published, with the concurrence and assistance of the Government (see preface to the first edition of *Rambles and Studies in Bosnia, Herzegovina, and Dalmatia*), a popular account of my visit to the capital of Bosnia, making, however, the proceedings of the Archæological Congress at Sarajevo the *pièce de résistance* of my book. In my description of the Neolithic station of Butmir I formally stated my reasons for believing that the settlement was of the nature of a pile-structure. In replying to the assertion of M. Reinach (*L'Anth.*, 1894, No. 5, p. 8), viz., that the existence of these hollows was an indication favourable to the idea that the huts had been placed directly on the clay, I thus expressed my opinion as to their *raison d'être*:—

“But M. Reinach in making the statement could not have devoted much time to the study of the problem, otherwise he would not have overlooked the obvious explanation that they are the clay-pits which supplied the large amount of clay used in the various arts and industries carried on by the inhabitants. The clay here is of a very fine quality, and admirably well adapted for the

¹ Before the publication of the second part of the monograph, the scientific staff of the Landesmuseum at Sarajevo suffered an irreparable loss in the death of Radimsky, which took place on 27th October 1895. The superintendence of the excavations at Butmir and the arrangement of its archæological materials for the press were entrusted to Franz Fiala, curator of the prehistoric department of the Museum, who, therefore, edits the second volume.

manufacture of all kinds of earthenware. It was out of it that the dishes, loom-weights, net-sinkers, spindle-whorls, and even some of their household gods, were manufactured. Nor is it by any means improbable that its excellent quality, so readily procurable, was one of the primary reasons for selecting this locality as the site of the village. But probably the greatest demand for this clay would be to plaster over the roofs and walls of their huts, to lay hearths and floors over the common wooden platform, and to make ovens or bakeries for cooking purposes. The large consumption of this material that went on from time to time is shown by the frequency with which it was met with in thin layers, and otherwise throughout the entire mass of the relic-bed. Indeed I may safely assert, that of the various component ingredients of this latter, clay represented the largest. Whence, it may be asked, did all this clay come from, and how came it to be so largely and uniformly distributed throughout the mass? It came to a large extent directly from the huts, which, owing to exposure to sunshine and rain, would be readily pulverised or washed down. When the first nucleus of the settlement was being constructed, the workmen found this most essential material just at hand, probably on the very site on which they were erecting the wooden structures, and it is also probable that after the requisite number of huts was erected, the clay subsequently required would be taken from outside the habitable area, and as the community increased the exhausted pits would be covered over by the extension of the common platform. Hence it may not be strictly accurate to say that all these pits existed prior to the foundation of the settlement. Nor, for the same reason, does it follow that idols found on the floors of some of the hollows belonged to the earliest founders." (*Loc. cit.*, p. 116.)

I founded the above opinion on certain arguments based on a number of authentic observations, of which the following is a brief summary :—

(1) The extreme irregularity both in form and size of the so-called hut-foundations (see Figs. 167, 168, and 169).

(2) The occasional presence of pieces of charcoal, pottery, and other débris of occupation in the upper layer of the virgin clay, showing that the deposition of the latter had not entirely ceased when the settlement was founded. M. G. de Mortillet also expressed the opinion that the site was formerly marshy (*Rev. de l'Ecole d'Anthropologie*, 1894, p. 381).

(3) The general horizontality of the layers lying over the hollows as shown on Fig. 170, together with the presence of some of the idols and other relics among the stuff which these hollows contained. A glance at Fig. 170 shows that the strata run across the hollow, and must have been laid down shortly after the latter was dug.

(4) Want of evidence of hearths or fire in any of these

hollows, while in various places throughout the débris there were portions of burnt and beaten clay platforms, as well as

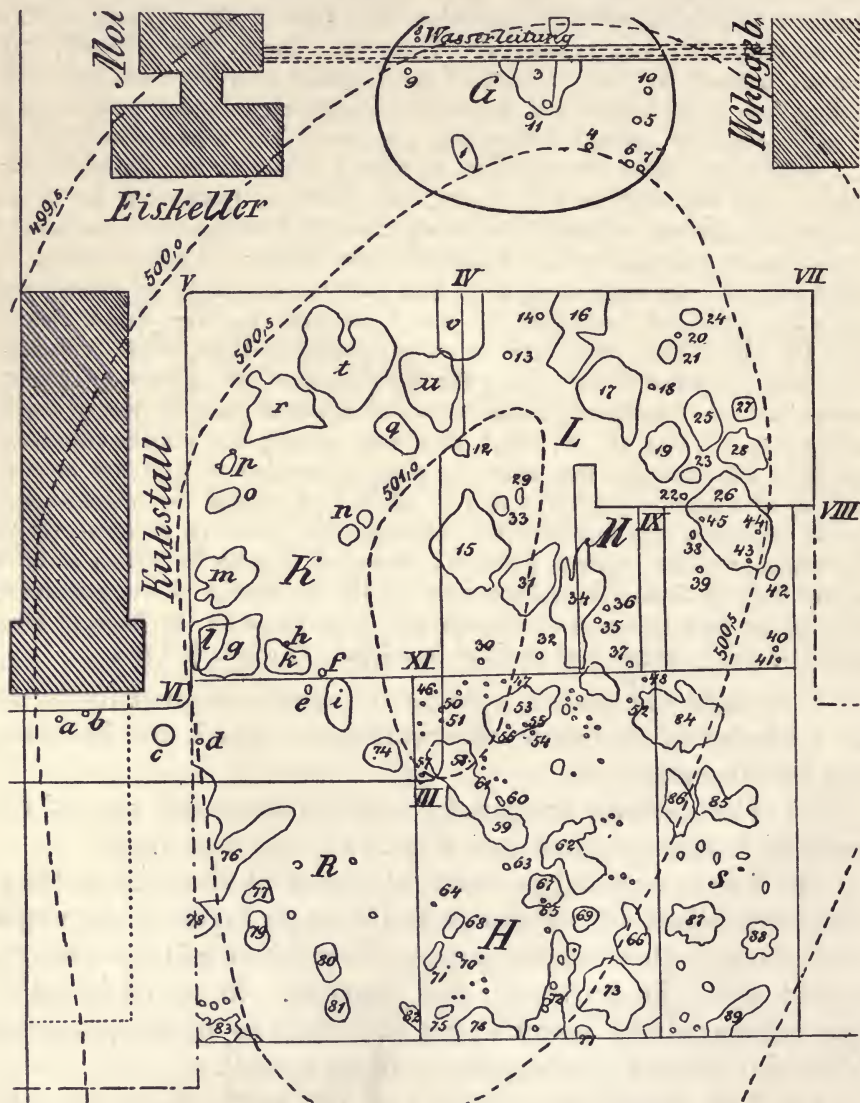


FIG. 169.—Plan of the Whole Area excavated, showing the Shapes and Relative Sizes of the supposed Hut-foundations. (After Radimsky.)

numerous fragments of the clay casts of the timbers which formed the walls of the huts.

On the other hand, the strongest argument against the hypothesis that the settlement had been a pile-structure



Idols of Butmir.



was the absence of piles—a fact which applies to all the woodwork, bones, and horns, which must have been largely used as handles for weapons and tools.

The results of the excavations recorded in the second part of the monograph on Butmir have not materially altered the conclusions already arrived at, as regards the chronological range and archæological character of the station, beyond greatly increasing the number of relics. No object of bronze was encountered during the three years of further excavations—practically nothing but objects of stone and pottery. More pile-holes in the underlying clay were observed in several parts of the excavations, as shown at

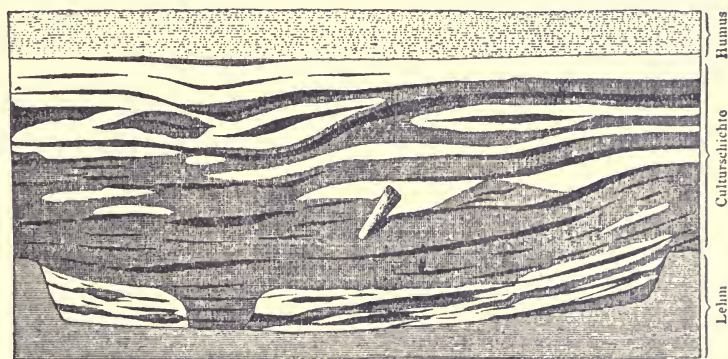


FIG. 170.—Section of Relic-bed at Butmir, showing Stratification. (After Radimsky.)

d, d, on Fig. 168. The late Gabriel de Mortillet had expressed the opinion that Butmir was not an ordinary residential village, but a workshop for the manufacture of pottery and stone implements, and that the disputed clay hollows were pits for firing the clay vessels, which must have been made in enormous quantities. Mortillet founded his opinion on the comparative scarcity of animal remains in the form of food-refuse and the almost entire absence of hearths. To these views Radimsky replied that if the clay-pits had been used for firing the newly-made pottery, marks of burning would have been seen on the walls and floors of the pits; but no evidence of this kind had ever been observed. As to the scarcity of bones, they, like all the wooden implements and organic materials, had vanished by decomposition—the

locality being particularly unfavourable for the preservation of organic remains. Quantities of charred corn were found in twelve different places, and also burnt-clay floorings in many places throughout the *débris*. That seeds and corn had been largely used as food is inferred from the fact that not less than nine hundred stone grinders (*Mühlstein*), including fragments, were found throughout the station. Besides, the usual stone implements found in Neolithic settlements were collected in great numbers—such as knives, saws, scrapers, borers, chisels, hammers, axes, and adzes. It is almost unnecessary to add to the critical observations already made on the supposed hut-foundations and their relation to the culture strata and relics, as no fresh arguments or new material are brought on the field of discussion. The clay hollows—the supposed *fondi di capanne*—assume forms which are equally fantastic, unsymmetrical, and variable in size as those described in the first monograph, as may be seen by a glance at Fig. 169, which shows the ground plans of all the hollows hitherto exposed on the site.

The industrial remains consist of some seventy fragments of idols, mostly in human form, quantities of broken pottery, and a large assortment of stone implements similar to those already described. Of bone there were only three small objects like polished pins, one showing a hole at which the object was broken. The following table gives a summary of the clay objects collected during the entire series of excavations, extending over a period of four years. (*Monograph of Butmir*, part ii., p. 22.)

Tabulated List of Clay Objects found at Butmir during the Excavations from 1893 to 1896.

| | 1893. | 1894. | 1895. | 1896. | Total. |
|---|-------|-------|-------|-------|--------|
| Idols | 21 | 31 | 25 | 14 | 91 |
| Animal figurines | 1 | 1 | 6 | 1 | 9 |
| Human faces | ... | 1 | 5 | 2 | 8 |
| Whole or restored vessels | 17 | 32 | 31 | 13 | 93 |
| Fragments of pottery, with spiral ornamentation | 8 | 36 | 56 | 17 | 117 |
| Pottery—various forms | 338 | 379 | 548 | 228 | 1493 |
| Clay weights over 8 cm. in diameter | 33 | 23 | 15 | 22 | 93 |
| ” ” up to 8 ” ” | 173 | 99 | 124 | 53 | 449 |
| Small spinning-whorls | 1 | 2 | 4 | 2 | 9 |



Pottery from Butmir, with spiral and other ornamentation.



The idols, like those of 1893 (Pl. LXVII.), show great disparity of technique in their execution. Only one was whole. The others, some seventy in number, are represented by eight heads, six hands and feet, forty-one torsos, and fourteen undetermined pieces.

As regards their position in the *débris*, we are informed that nineteen were found from 5 to 40 centimetres above the underlying clay-bed, either in the substance of the *débris*, or in that directly above the clay hollows; fifty-one were immediately on the surface of the clay-bed, or on the floor of the hollows; and one at a height of 70 centimetres above the clay-bed. In the upper portion of the culture *débris* not a single specimen had been found.

Among the works of art not previously met with, are eight small oval plaques, like objects with human faces on one side, which Radimsky thinks might have been appendages of vessels.

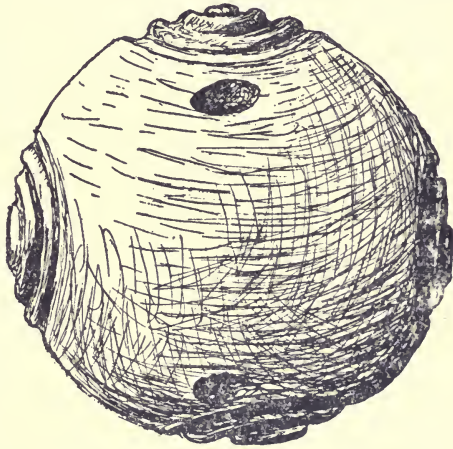


FIG. 171.—Globular Weight of Burnt Clay ($\frac{1}{2}$).

Among the general pottery there were no whole vessels, with the exception of very small ones, but yet a considerable number had been sufficiently restored from fragments to show their size and form. They were all hand-made and of various shapes—vases, bowls with or without feet, cups, jars, etc.

Plate LXVIII. is a reproduction of one of Radimsky's illustrations showing a number of fragments of the fine black pottery ornamented with a variety of the spiral ornamentation. The provenance of this style of ornamentation, as well as of some of the better-made idols, has given rise to much speculation. A few flint and other objects are figured on Plate LXV. (B). Fig. 171 represents a globular weight of burnt clay, an unusual form in the industrial remains of primitive habitations.

4. *The Pile-structure at Ripac.*

Ripac lies $9\frac{1}{2}$ kilometres south-east of Bihac, on the east bank of the river Una, a tributary of the Save. Here the stream widens considerably, forming a kind of lake in which are two small islands accessible by bridges supported on piles (Fig. 172). Like other Bosnian streams, the water of the Una holds in solution a large amount of calcareous materials, which on exposure to the atmosphere are deposited, causing in some localities barriers (*Katarakte*) right across the stream. As these barriers gradually increase in height the waters behind them in sluggish streams become more or less dammed up. The miniature falls and currents by which the waters escape over these obstructions are often utilised as the motive-power of corn-mills,¹ such as may be seen at Ripac, Bihac, and other places on the Una. At Ripac, two such barriers stretch to both shores from the larger island, over which may be seen numerous mills planted

¹ Throughout Bosnia these corn-mills are frequently to be seen, especially in the vicinity of waterfalls. For instance, at Brekovica there are some forty mills arranged in several rows on the Kostel Waterfall. I have visited several at Jaice, erected over the rapids immediately above the famous Falls of the Pliva. The *modus operandi* of these primitive mills is thus described in my book on Bosnia:—"We entered one, and inspected the internal arrangements. Extended along the wall, facing us as we entered, was a row of ten small hoppers containing different kinds of grain. Each hopper was suspended over a rapidly whirling grinding-stone fixed to a wooden shaft which descended through a hole in the lower millstone, and terminated in a stone socket in the bed of the river. A few inches above this socket the shaft was armed with ten or fifteen spoon-like spokes, against which a current of water was directed by means of a long wooden aqueduct. The irregular motion of a stick, kept bobbing on the surface of the millstone, was conveyed, by means of another slender stick attached to it, to the outlet of the hopper, and thus regulated the supply of grain. The miller raised a lid and showed us how the meal dropped over into a box in front of the stone." (*Loc. cit.* p. 32.)

The water arrangements of another of these mills which I saw near Travnik is thus described:—"Close to the horizontal wheel was a long stout log of wood, perforated lengthwise, and poised at an angle of about 45 degrees. At its lower extremity the perforation slanted so as to bring the direction of the orifice into the horizontal line. A rudely constructed wooden conduit, supported on stakes, conveyed the water to its other extremity. If the conducted current contained more water than was necessary to keep the tube full, the surplus just spluttered over. Such was the ingenuity of this simple arrangement that it secured a propelling power of uniform strength. It did not matter how much water was conveyed, as it could do no more than fill the tube; and hence the velocity of the wheel was regulated by a force which always remained constant. It was, in fact, a pure turbine." (*Ibid.*, p. 50.)

on tall piles. Another, situated about a kilometre below Ripac, had increased so much in height within recent years, that the level of the expanse of water between it and the Ripac mills had caused frequent floodings of the adjacent lands.

At length, in 1890, at the request of the neighbouring proprietors, this obstruction was demolished, the result of which was to lower the normal level of the Una by 1.50 metres. To some mills this was a great improvement, as it procured a

RADIMSKÝ: Der prähistorische Pfahlbau von Ripac bei Bihać.

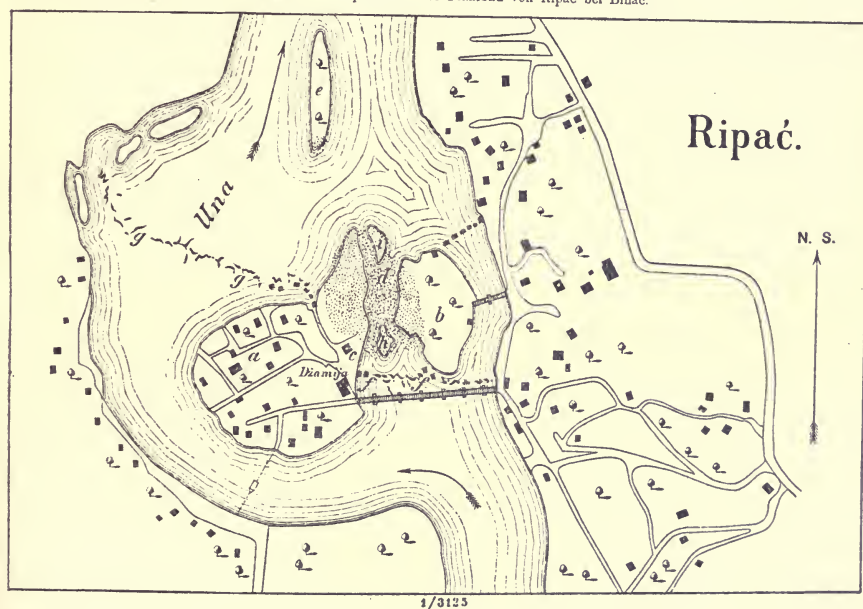


FIG. 172.—Plan showing the Site of the Pfahlbau (*d*).

greater fall of water-power, but to others, especially those situated in the channel between the two islands, it was no benefit, on account of some deposits, previously submerged, which prevented the downward flow of water. The owners of these mills ultimately resolved to remove this obstruction. It was while this work was being executed in 1892 that the prehistoric pile-structure was discovered. In course of removing the obstructive materials the workmen encountered the stumps of thickly-set piles in a blackish relic-bed containing fragments of pottery, clay weights, broken bones, etc. This discovery was recognised to be of so much importance that

Government gave orders to have the site explored under the supervision of Radimsky, the chief inspector of mines.

The houses at Ripac are situated on both sides of the river, as well as on both the islands. In the Middle Ages the whole area of the larger island had been occupied by a burg, or fortified castle, which, however, was destroyed in 1697. There are also to be seen on it remains of a Roman building.

In course of the systematic excavations carried on during the summer months of 1893 and 1894, it was ascertained that the prehistoric pile-structure not only occupied the whole space between the islands, but also extended for a considerable distance under them. The site thus indicated measured 104 metres in length and 66 metres in breadth, *i.e.* 3753 square metres. (See plan, Fig. 172). A few piles were observed at the south end of the sandbank (*e*), and it is supposed that the pile-structure extended thus far. Plate LXIX. (A) shows the tops of numerous large piles under the bridge, while B represents the horizontal planks and piles of a platform. The surface deposits over the piled area, now above water, contained only Roman and later remains. Underneath this stratum was a gravelly deposit of mixed materials overlying the true culture-bed, which extended over the whole site with a varying thickness of 10 to 80 centimetres. It contained the remains of burnt beams, the débris of platforms and huts, organic materials, together with a large assortment of relics of the prehistoric period. Underneath this relic-bed was a sandy deposit of river detritus, which formed the bed of the river when the pile-dwelling was first erected. The piles were mostly of oak stems, sometimes split and perforated, but of which only the stumps as a rule were now to be found. There were apparently two sets of piles—a lower and an upper—which suggest an earlier and a later structure. From these and other observations it would appear that when the Pfahlbau of Ripac had been constructed the water in the river was at a lower level than in modern times. There was also evidence that the settlement, or at least a portion of it, had been destroyed by a conflagration. But this catastrophe did not bring it to an end, as shown by the upper and lower series of piles (Pl. LXIX. (B)). It was not, however, clearly ascertained whether the



A.—Showing Piles below the Bridge and Corn-mills behind.



B.—Showing two sets of Piles and a Platform.

Pile-structure at Ripac.



reconstructed portion was a pile-structure or an ordinary land-habitation. The industrial remains found during the excavations prove conclusively that the pile-habitation of Ripac existed from the end of the Neolithic period, that it was continuously occupied during the Bronze and early Iron Ages till taken possession of by the Romans, and that in the Middle Ages the larger island became a fortified castle or burg.

The objects collected are of iron, copper, bronze, silver, lead, stone, clay, glass, bone, wood, and vegetable fibre. The organic remains, mostly charred, are represented by bones, seeds, fruits, straw, and the droppings of animals. Among this large assortment of relics are numerous objects characteristic not only of the Stone and Bronze Ages, but of the well-defined periods of Hallstatt and La Tène.

Mr Radimsky states that indications of analogous pile-structures are to be seen at several other localities on the river Una, viz., Globulic, Ribic, Kralje, and Brekovica. In the vicinity of Ripac is the famous necropolis of Jezerine, as well as a number of hill-forts, all of which were explored and described by Radimsky.

A few of the characteristic relics from this pile-structure are figured on Plate LXX.

No. 1 is a steel for striking sparks from a piece of flint, which, till the invention of the lucifer match, was the common method among working men in that country of lighting a tobacco pipe. The antiquity of this and of another specimen which turned up is not beyond doubt, although in the necropolis of Jezerine a similar steel was found in a grave, associated with fibulæ and amber beads (Band iii., S. 72, fig. 83); No. 2 is a small sickle of La Tène type; No. 7 a Roman axe-head; Nos. 8, 9, and 10 are fibulæ of the Hallstatt period; No. 11 represents a Roman fibula; No. 12 is a spiral arm-band of the Bronze Age; No. 6 is a spoiled casting of a socketed celt of bronze; Nos. 14 and 15 are stone moulds for a similar celt and a dagger; No. 16 is a clay bobbin; Nos. 17 and 18 are rude figurines in the form of men and some kind of animal; No. 13 is a Roman weight of bronze; Nos. 19 and 20 are clay weights of various shapes; No. 22 represents a group of five spindle-whorls ornamented; No. 24 is a perforated

boar's tusk; No. 26 is a serrated implement of bone; No. 27 represents three spatulæ of bone; Nos. 29 and 30 are made of deer-horn; No 28 shows three bone needles; No. 25 is a small plaque ornamented with concentric dot and circles. Pottery was in great abundance and variety, but on the Plate it is only feebly represented by Nos. 31-33. Seven Roman coins of bronze were found at Ripac.

LITERATURE.

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5. *The Pfahlbau of Donja Dolina.*

The remains of the Pfahlbau of Donja Dolina Bezirk Bosnisch - Gradiska are to be found among sedimentary deposits on the south bank of the river Save, a tributary of the Danube. Here an oval-shaped terrace, some 500 paces in length and half this in breadth, presents on the north side a steep front to the river, but otherwise falls away gradually, except at the west end, where the escarpment turns inland for some distance. Its surface is 3 or 4 metres higher than that of the surrounding land, and it is almost the only spot in the neighbourhood that is not submerged during the periodical floodings of the Save. For this reason it has been selected for the sites of the district cemeteries, one for the Catholic and another for the orthodox people. During heavy floods the surrounding inhabitants here find shelter and security both for themselves and their cattle till the waters subside. The country people call it “Gradina” (*i.e.* Burg), a word which is always in Bosnia associated in the minds of the country folk with some kind of ancient settlement (see Figs. 173 and 174). In commenting on the physical conditions under which the terrace was formed, Dr Truhelka shows that on its west side the Save had altered its course, having formerly flowed more to the south than it now does, by which a bay was formed, as shown by the dotted line on the sketch (Fig. 173).



Relics from Ripac. (Nos. 1-13, 16-18 = $\frac{1}{2}$; 14, 15, 19-30 = $\frac{1}{4}$; 31-33 = $\frac{1}{2}$.)
(After Radimsky.)

For several years articles of antiquarian value from the vicinity of Donja Dolina were now and again presented to the Landesmuseum at Sarajevo—a fact which at last induced

SLAVONIEN

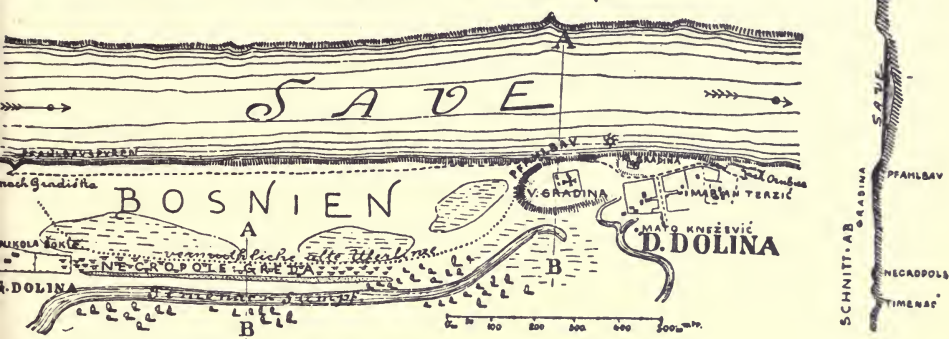


FIG. 173.—Sketch Map showing the position of Donja Dolina. (After Truhelka.)

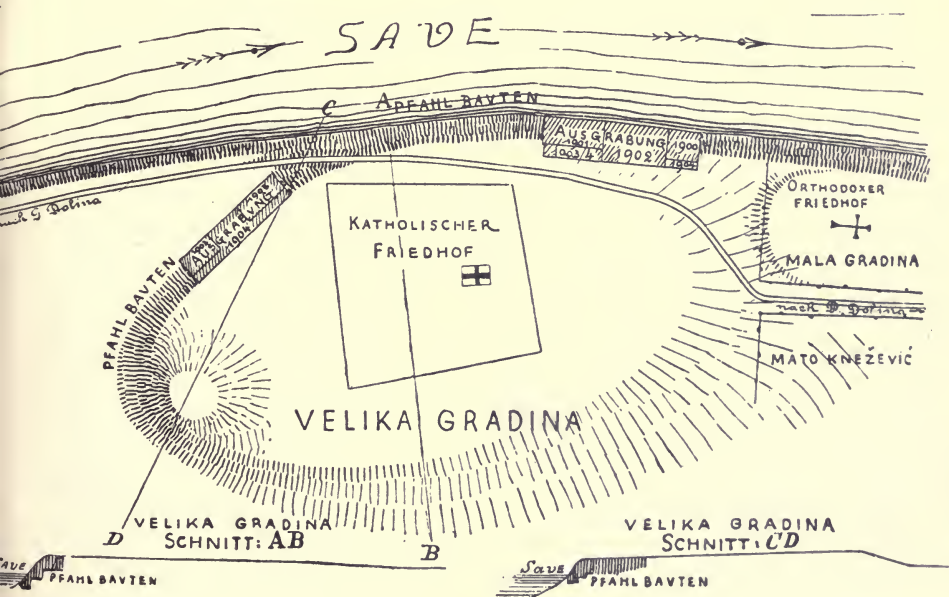


FIG. 174.—Plan of the Pile-structure of Donja Dolina. (After Truhelka.)

Dr. Ciro Truhelka, head of the archaeological department, to visit the locality. This visit took place in 1899. On arrival he inspected several places where prehistoric antiquities had been found, without, however, any marked result. He then

made a hurried inspection of the river along the steep margin of the "Gradina." Here he observed the tops of oak piles protruding through the river mud, while scattered around them were fragments of pottery, spindle-whorls, and prism-like objects of burnt clay, worked portions of deer-horn, etc. These indications left no doubt in his mind that before him lay the débris of a prehistoric habitation constructed on piles. In consequence of these observations systematic excavations were begun in the following year (1900), and continued during several successive seasons when the water-level of the Save was favourable. A comprehensive report of the excavations was published in 1904, by Dr Truhelka, which was followed by a supplementary report in 1909.¹ These valuable reports give a clear idea of the structure and chronological range of this interesting settlement.

During the earlier stages of the investigations it became apparent that the structural details deviated in many particulars from the ordinary Pfahlbauten, as hitherto known in Europe. Hence it became necessary to prosecute the researches with precision and care. An event which greatly helped the researches was the discovery and identification of the cemetery in which the inhabitants of the pile-structure buried their dead. It was located at a distance of some 600 paces to the south-west of the Pfahlbau, and 200 paces from the present bed of the river. Following the dotted line on Fig. 173, indicating a former river bank, for about 500 paces, the visitor comes to some flat ridges which are only submerged on the occasion of exceptionally high floods. These ridges, called "gredas" by the country people, are now cultivated, but in former times they were used as a cemetery. It was soon discovered that the grave-goods associated with these interments were, from the standpoint of archæology, precisely similar to the relics disinterred from the excavations in the "Gradina." This necropolis contained both burnt and unburnt burials, and its investigation has yielded an immense assortment of relics

¹ Truhelka, Dr. Ciro—*Der vorgeschichtliche Pfahlbau im Savebette bei Donja Dolina*. *W. Mitt. aus Bosnien und der Herzegowina*, 1904. (With 84 plates and 108 illustrations in the text.) *Der Pfahlbau von Donja Dolina*. Nachtragesbericht über die Grabungen im Jahre, 1904. (With 7 plates and 9 illustrations in the text, 1909.)

which have materially helped to define the chronological horizon of the pile-dwellers.

Excavations were first begun on the north margin of the "Gradina" close to the river, and subsequently on its west side. The fluctuations of the water-level of the Save vary to the extent of 7 metres, and when the highest level was reached all the operations within that limit had to be stopped. The first interesting discovery was a row of piles running parallel to the river, which proved to have been the under portion of a palisade against the current, as the piles were bound together by intertwining willow thongs. This palisading could only be followed for 19 metres, but there was little doubt that it extended along the whole length of the settlement. In continuing the excavations the remains of several houses supported on piles were brought to light. The woodwork, especially in the upper strata, was so decayed that it had to be soaked with a chemical mixture to prevent its crumbling away. The piles were thickly set, no less than nine hundred and seventy-eight having been counted over an area of 1160 square metres—nearly one for every square metre. Many of them, however, belonged to a later period, and were inserted to strengthen old piles or for the support of new houses. The accompanying illustrations (Pl. LXXI., A and B) show the supporting piles of one of the houses (A), marked No. 11 on Truhelka's plan, and the foundations of two houses (B) erected over the tops of the piles, with an intervening bridge. The piles varied from 10 to 45 centimetres in diameter and from 1 to 4 metres in height. They were for the most part made of oak stems still retaining the bark, but occasionally specimens of ash or elm were met with. They were very seldom split or squared, but the tips penetrated deeply into the mud, being well pointed with sharp tools. A little back from the river palisade there was a raised platform from which a sloping bridge gave access to the vaults containing the supporting piles, as well as to the houses erected above them. It appears that these vaults served as cattle-pens, an inference derived from the fact that large quantities of the dung of domestic animals were found in them. Little of the structural details of the dwelling-houses remained, except the foundations of the

walls and some split boards, which generally crumbled into dust as soon as they were exposed to daylight. From a comparison of the more perfect remains many deficiencies were made up, and thus a fairly correct idea of the architecture and plan of the houses was obtained. Each house consisted of a large room and one or two smaller apartments. The former was regarded as the kitchen, as it contained a fireplace, a well-made hearth of burnt clay, and an oven of clay, often ornamented (Pl. LXXII., No. 13). During the excavations the sites of some eleven houses were exposed, all of different dimensions, one measuring 4.5 metres by 6 metres, and another 6 metres by 9 metres. It appears that in the course of time the houses had to be erected on a higher level, owing to the accumulation of débris (as was the case in the *terremare* of Emilia), or to a gradual rise of the water-level of the Save. These later houses had of course to be superimposed on the ruins of the older ones. As some of the original piles were found to be quite sound, the builders considered it more advantageous to utilise them by adding to their height instead of inserting new ones. This was ingeniously accomplished by laying strong cross-beams over the tops of the existing piles, and upon these the new piles of the requisite height were placed.

It is difficult to determine the former extent of the settlement. Strong stumps of piles were met with over a large area of the adjacent river-bed. It has also been ascertained that in digging graves in the Catholic cemetery the same class of relics was turned up. From these and other facts it has been conjectured that the whole of the "Gradina Hügel" was formerly occupied by pile-dwellings. The area that could be thus utilised may be stated approximately at 25,000 square metres.

A new feature of this pile-dwelling was the discovery of a few wooden coffins containing the remains of human skeletons (Pl. LXXIII. (A)), which had been buried in the vaults beneath some of the houses. They were deposited at a depth of 1 metre in the underlying mud into which the supporting piles had been driven. One coffin, that of a child, had the skeleton below the pelvis destroyed by a pile which penetrated through it, thus showing that this burial was older than the reconstruc-





A.—Showing the under-structures of House No. II



B.—View of Houses IV. and V., with Bridge between, partly restored.

The Pile-structure of Donja Dolina.



Relics from Donja Dolina. (All $\frac{1}{2}$ actual size, except 10 = $\frac{1}{6}$, 21 = $\frac{2}{5}$, and 13 = $\frac{2}{15}$.)



tion of the house. The remaining portions of both coffin and skeleton are now preserved in the Landesmuseum at Sarajevo. Two bone beads, probably amulets, were the only grave-goods found along with the skeleton. The preservation of these coffins was supposed to be due to their position in the understratum of river-mud, which was generally below the level of the river-water. When buried, the coffins had been covered with boards above which the earth had been laid.

Latterly a few urn-burials were encountered in these underground vaults which contained the incinerated remains of bodies, charcoal, ashes, and an extraordinary wealth of grave-goods, but unfortunately the latter had been greatly damaged by the fire. It would appear from the valuable nature of the grave-goods that the cremated persons were of great social distinction. The objects consisted of fibulæ, spiral bracelets (Pl. LXXIII. (B), Nos. 3 and 9), beads of glass, amber, and enamel, and other ornamented articles characteristic of the late Hallstatt period. Of special interest was one urn, which contained a necklet composed of several hundreds of beads of amber, enamel, coloured glass, seven cowrie shells, two perforated teeth, and a large bead of clay without any ornamentation.

Hearths of burnt clay and fragments of ovens made of the same material and sometimes ornamented (Pl. LXXII., No. 13) were found in almost every house. Dr Truhelka has suggested that certain four-sided prisms (Nos. 3, 6, 7), larger at one end than at the other, were used for heating and cooking purposes. Formerly such objects were regarded as weaving-weights, or net-sinkers. Among the relics which indicate the probable date of the settlement were five coins, one of bronze and the others of potin—all "barbarous imitations of the tetradrachms of Philip of Macedonia" (356-336).

In the ornamentation of the pottery the manufacturers had made use of incised lines, knobs, and raised bands adapted in a variety of designs, as shown on Pl. LXXIV., which is here reproduced from one of Truhelka's full-page illustrations, but on a slightly smaller scale. As to the mass of general antiquities found on this remarkable station, I have figured a few characteristic specimens on Pls. LXXII. and LXXIII.,

from which it will be seen that its chronological range may be paralleled with the few centuries which witnessed the transition of cutting implements from bronze into iron, as shown by the contents of the cemetery at Hallstatt and the military fort of La Tène.

Concluding remarks.

(1) In instituting a comparison between the various structures described in this chapter and the *terremare* of the Po Valley, it is to be observed that certain features are characteristic of them all, and that the points on which they differ depend on the interpretation of the word *terramara*. Originally this term was only applicable to the fertilised materials found in certain low mounds, now known to be the *débris* of human habitations. From this point of view all organic refuse associated with ancient inhabited sites might be so designated. If, however, we define a *terramara* as containing all the structural details of Castellazzo—moat, dyke, *contrafforte*, piles, platforms, citadel, ritual pits, etc., within a trapezoidal enclosure—then it must be admitted that there are no such structures outside Western Emilia. Excluding the Castellazzo type, as only exceptional instances of military forts erected on the frontier between the *Terramaricoli* and the *Liguri* (as described on p. 428), we have in the remaining *terremare* a combination of habitations sufficiently divergent in structural details to supply parallels to all the habitations I have described outside the Po Valley.

No piles were found at Demorta (p. 403). Neither hut-foundations nor a dyke were detected at Romei and Fiastri (p. 402). Coppi denied that the piles at Gorzano belonged to *palafittes* (p. 326). Castellaccio had piles and hut-foundations, but no dyke (p. 373). It is undetermined whether Lagazzi should be described as a *terramara* or a lacustrine pile-structure. Yet the cultured remains on all these stations belonged to *terramara* types.

In pile-structures constructed on marshy ground, liable to flooding, dykes were, in many cases, indispensable, as in the *terpen* and other analogous sites along the coast of the German Ocean. These latter present a striking parallelism to the



A.—Two Coffins between Houses III. and IV.



B.—Relics from Urns. (All $\frac{1}{2}$, except No. 9 = $\frac{3}{4}$.)

Donja Dolina. Various remains

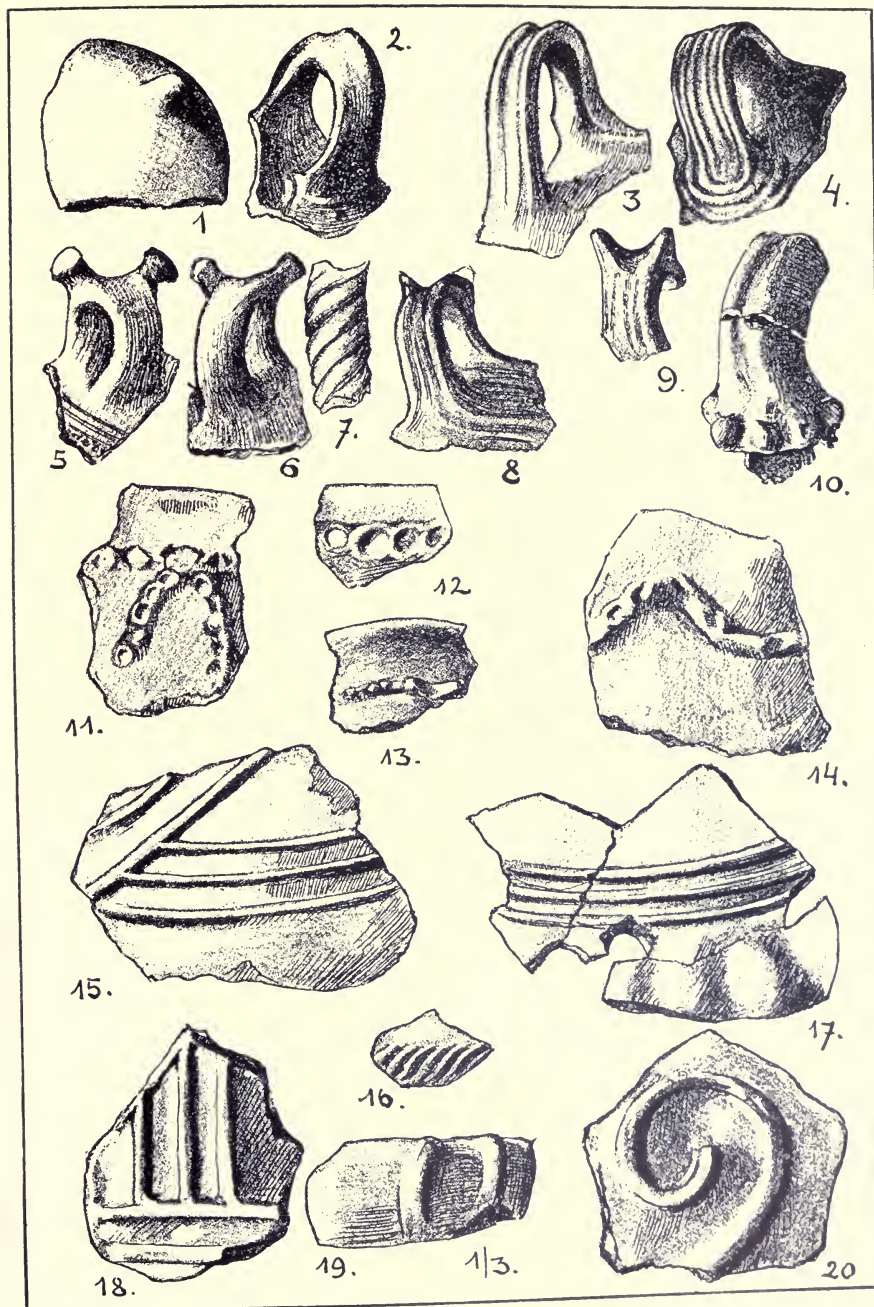
[To face p. 474.]



terremare of the Po Valley in many respects, but yet their culture elements and chronological horizon are very different. The Hungarian deposits are essentially land palafittes. The pile-structure of Butmir belonged to the Stone Age, and it did not appear to have been necessary to construct a surrounding rampart, either for defence against enemies or flooding. The *ansa lunata*, although common in Bosnia in the early Iron Age (Pl. LVIII.), is not among the pottery of this station, with the exception of one specimen showing a rudimentary stage (*Monograph*, part ii., fig. 34). The Pfahlbauten of Ripac and Donja Dolina disclose many of the structural features of the ordinary terremare, and the frequency of the *ansa lunata* (Pl. LXXIV.) is strong evidence in support of the hypothesis that their constructors were a branch from the Danubian flow of lake-dwellers into Europe, who found their way into Bosnian land by ascending the tributaries of the Save.

(2) From the numerous object-lessons submitted to you in the course of these lectures, you will have gathered some general idea of the importance of pile-structures in the early stages of human civilisation. When forests, caves, and rock-shelters were no longer sufficient to accommodate the increasing numbers of patriarchal or nomadic families, the surplus population would have ultimately to migrate to localities which might have no such means of protection. In these circumstances necessity, the reputed mother of invention, would compel them to seek some artificial means of security and shelter, the particular form of which would largely depend on the physical conditions of the environment. If stones were abundant they might be used for the construction of primitive huts, and if these failed, their most probable resource would be to dig a circular trench in the ground and to cover it with a timber roof and thatch. If, however, the locality was swampy or liable to be flooded, it cannot be said that their ingenuity would be greatly overtaxed if they invented the plan of laying cross-beams over a series of supporting piles, so as to raise the floor of the hut above the soil. It is in low-lying districts on the banks of meandering rivers and the shores of lakes that the best grazing-lands are to be found, and hence as soon as they took to rearing domesticated animals and the cultivation of

cereals and nourishing plants, such localities would be selected as the most suitable places of abode. In the course of time bricks supplied the most convenient material for building houses in alluvial plains, such as the valleys of the Nile, the Po, and the Euphrates, where neither stones nor caves are readily available. The art of making bricks was known to the Babylonians some six thousand years ago, and they made such good use of their knowledge that the ruins of great walled cities and palaces, built entirely of burnt and glazed bricks, remain to this day as conspicuous landmarks, though buried under the accumulated débris of hoary antiquity. But before the invention of bricks the walls of huts were constructed by driving piles into the earth at convenient distances and connecting the inter-spaces with wicker work and clay plaster. Owing to the liability of wood to decay, especially if located in deposits which are intermittently wet and dry, such as land-huts, we have little evidence of the extent to which it was used in prehistoric times. That, however, the antiquity of pile-structures dates back to the Neolithic Age is amply proved by the numberless stumps that have survived to the present day in the lakes, rivers, and bogs of Europe. But the material and structural details of a primitive habitation are of less importance to the archæologist than the evidential remains of the culture and civilisation of its occupants. To elicit all the information possible from an assortment of lost, broken, and worn-out objects, and a mass of semi-decayed food-refuse—bones, horns, shells, nuts, seeds, organic fibres, etc.—is a problem that requires the assistance of experts from nearly all the collateral sciences. To many these materials may appear too insignificant and trivial to afford sustenance to the philosophic mind, as indeed they were regarded up to a few years ago by classical scholars. But nothing that can be said on this point can obliterate the fact that they are the unwritten records of the civilisation of our prehistoric forefathers, and the foundations of the science of Archæology.



Specimens of the Ornamentation on Pottery from Donja Dolina. (After Truhelka.)



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INDEX

- AALZUM, terp of, and excavations at, 435
 Abbeville and Amiens, discovery of palæoliths at, 42, 43
 Abbeville flint-bearing deposits, 30
 Abbott, Mr, on tranchets, 278
 Acheuléen epoch and flints, 40, 42, 201
 Acton Church, mammoth remains discovered at, 32
Ad ascia (handle), 372
 Alberti, Dr, and lacustrine exploration, 382, 388
Alces latifrons, 178
 Alfonsi, Sig., and Lake Arquà stations, 397
 Allevi, Marquis, on remains at Offida, 334
 Altamira, ornamented caverns of, 218 ; plan of cavern, 226 ; tectiform and scutiform figures, 228 ; engraving of bison, 228 ; paintings of animals, 229
 Amber (as beads), 106, 344, 353, 387, 440, 445, 467
 Amiens, flint implements (coup-de-poing type), 30, 32
 Ammonite, fossil, 74
 Amulet of ivory, 130 ; fish-tail form, 213
 Anchor of wood, 365
 Anderson, Dr J., 261
 Angelucci, Capt. A., and lacustrine exploration, 348, 349, 355
 Animal functions, 5 ; development, 9, 13 ; intelligence, 14
 Animal painting, sculpture and engraving (Palæolithic), 212-240
 Animals and plants, degeneration, 7
 Annone, Lake of, palafittes in, 362
Ansa bilobata, 406
 appendiculata, 297, 391
 cornuta, 337, 373, 396, 402
 lunata, 298, 319, 330, 352, 377, 380, 382, 401, 424
 489
 Anselmi, Cav. A., on Le Conelle antiquities, 413
 Anthropomorphism and man, 11
Antiquity of Man (Sir C. Lyell's), 99
 Antiquity of man, in correlation to chronological sequences and natural phenomena, 68 ; geological evidences of, 99
 Anvils, of bone, 59, 61, 80, 148, 177, 273, 365
 of bronze, 301, 327, 356
 Palæolithic, 80
 Apes, anthropoid, 11 ; and man, 90, 101, 202
 Appel, Baron, and Archæological Congress at Sarajevo, 452
 Arcelin, M., and Solutré excavations, 51
 Archæopterix, 13
 Arcy-sur-Cure jaw, 96
 Arquà-Petrarca, lake-dwelling remains, 395, 397'
 Arrow-points, of bone, 47, 48, 50, 67, 331, 356
 of bronze, 356, 368, 380
 of flint, 389 *passim*
 of iron, 445
 of rock crystal, 353
 laurel-leaf shape, 377, 389, 394
 Arts and industries of Palæolithic races, 200-240
 Ascent of Man, 10, 11
 Astronomical phenomena, correlative with climatal changes, 68
Atlantosaurus, 7
 Aurignac, grotto of, 47
 "Aurignacien," the term of, 39
 Aurignacien epoch, 42, 201 ; controversy on, 206
 Avebury, Lord, on Palæolithic and Neolithic periods, 38
 Awls, of bone, 59, 61

- Awls, of bronze, 301, 327, 356
 of flint, 125, 389
 Axe-hammers, 107, 265
 Axe-heads (Roman), 363, 467
 of deer-horn, 378
 Axes, of amphibolite, 333
 of bronze (double-edged), 370
 of horn (socketed), 279
 of nephrite, 373
 of serpentine, 394
 of stone, 96, 333, 395, 410
 Aymard, M., and Denise fossil bones, 95

 BAER, von, on Evolution, 10
 Balestri di Brescello, terramara at, 330
 Ballarini lacustrine collection, 379
 Ballynamintra cave (Ireland), relics, 105
 Balme, grotte de, 69
 Banded lemming, 80, 81
Baoussé-Roussé, 159
 Baouso da Torre, grotto du, 160
 Bardello, lake-dwelling of, 356
 Bardon, M., and Chapelle-aux-Saints
 excavations, 138
 Barma Grande cave and skeletons, 160,
 163, 166; skull, 150
 Basin with raised handle, 380
Bâton de Montgaudier, 211
Bâtons de commandement, 70, 74, 77, 117,
 150, 151, 213; ornamented, 70, 74,
 213
 Battaerd, Mr, on terpen, 436, 437, 441
 Beaches, raised, 27, 107
 Beads, of amber. See Amber
 of stone, 380
 of vitreous paste, 366
 Beaver-traps, 393, 394
 Bedford gravel-pits, 31
 Beetgum, terp of, 441
 Belgrand, M., 142
 Bellaguardo, terramara at, 330
 Bellerive, 274
 Benz, and lacustrine exploration, 347
 Bertarina, hut-dwellings at, 412
 Bertrand, M. E., on Clichy skeleton,
 142
 Betche-aux-Roches, grotto, 123
 Béthenas, cave of, 69, 71; skull from, 71
 Biandrone, Torbiera di, lake-dwelling
 at, 356
 Biddenham gravel-pits, and remains of
 Elephas antiquus, 31
 Bigarello, terramara of, 330

 Bignotti, Sig., and urn-burials, 418
 Bipedal locomotion, 15
 Bise, cave of, 91
Bison europæus, 31, 66, 67, 123
 Bisons, engravings of (at Altamira), 228;
 (Niaux), 232, 233
 Boar's tusk, perforated, 468
 Bodio Centrale, lake-dwelling of, 354
 Boeles, M., and classification of terpen
 antiquities, 441, 443
 Boii, the, 293
 Bologna cemeteries, 307; hut-dwellings
 at, 407
 Bone caves, 32, 36, 46, 47, 48, 52, 53, 58,
 60, 61, 62, 63, 65, 66, 69, 71, 72, 73,
 75, 77, 83, 91, 118, 144, 256, 257. (See
 also under Cave bear)
 Boni, Sig., on terremare, 303, 322, 323
 Borers and burins of flint, 44, 61, 96, 148,
 279
 Borghigiano, Prof. S., on Borgo San
 Donnino, 293
 Borgo-Ticino, lake-dwelling at, 367
 Boring-stone, 352
Bos longifrons, 82, 154
 primigenius, 124, 152, 175; of Fries-
 land, 437
 Bosio, Torbiera di, 363
 Boué, M. Ami, and the Lahr skeleton,
 94
 Boule, M., on Grotte du Prince fauna, 85,
 86; on Chapelle-aux-Saints skeleton,
 139; and Moustier-de-Peyzac skele-
 ton, 153; and Grimaldi caves, 159;
 on upper Quaternary deposits, 204
 Bourgeois, Abbé, 204
 Bouyssonie, M., and Chapelle-aux-Saints
 grotto excavations, 138
 Bovidae incised on sandstone pebbles,
 216
 Brabbia, Torbiera di, lake-dwelling in,
 357
 Brabbia Cazzago, lake-dwelling, 355
 Bracelets, 363
 of bronze, 173, 440
 of shells, 130, 136
 spiral, 473
 Brain of man and anthropoid ape
 compared, 12
 Brassards, 380
 Brassempouy, figurines at, 48
 Bréchamps skull, 145
 Brenno, Torbiera di, 361

- Breuil, M. l'Abbé on the term "Aurignacien," 39, 206, 259; plaque of schist and bone tubes (figured by), 49, 50; on ornamented caves, 218-225
- Bridle-bits of iron, 440
- Brizio, Prof., on Bologna hut-remains, 407, 408; Grotta del Farnè excavations, 409; Pragatto, 410; Marche pottery, 413; Frassasi cave excavations, 414; on the Liguri people, 426
- Broca, M. Paul, on evolution of the chin, 19; Solutré and Béthenas skulls, 52, 72; Lahr skeleton, 95; Naulette jaw, 120; on flint industry transition, 244
- Brome, Captain, and Gibraltar cave researches, 179
- Bronze figure of Mars, 444
- Brown, J. A., on "Continuity of Palæolithic and Neolithic periods," 246
- Brückner on Glacial Epochs, 27
- Bruniquel cavern, 153
- Brünn skeleton, 65, 169; relics, 170, 171
- Brux skeleton, 169
- "Buche di pali," 304
- Buckland, Dr., on Kent's Cavern discoveries, 58; Hyæna Den, Kirkdale, 62; Goat's Hole, 63; on Paviland burial customs, 65; his description of Red Woman of Paviland, 196
- Buckle of bronze, 333
- Bullettino di Paletnologia Italiana*, 307
- Burial customs (Paviland), 65; of the Terramaricoli and Western Lake-dwellers, 417, 421
- Burials, Neolithic and Palæolithic, 65, 146, 147, 151, 152
- Bury St Edmunds, skull and flint implements of, 109
- Busk, Prof., 104; on Gibraltar caves, 179
- Butmir, Neolithic station of, 452; plan and sections of, 453, 454; excavations at, 453-455; the "hut-foundations" controversy, 455, 456, and Prof. Pigorini and Dr Munro's theory, 455, 457, 458; idols from, 459, 463; relic-bed, 461; list of clay objects found at, 462; globular weight and pottery from, 463
- Buttons, of bone, 439; perforated, 378 of amber, 373 of clay, 450
- Byzantine money, 440
- CADDINGTON, inhabited sites during Palæolithic period at, 86
- Calegari on terremare, 303
- Cambrian period, 9
- Campeggine, 297
- Camper, facial angle of, 17
- Campignien, Le*, 275
- Campigny hut-dwellings, 275; specimens of pottery from, 276, 297
- Canestrini on terremare, 303
- Canis lupus, C. vulpes*, 52
- Canoes, 361, 365, 367, 376, 393, 394, 440
- Canstadt skull, 102
- Cap-Blanc rock-sculptures, 234-237
- Capercaillie, 260, 282, 283
- Capitan, M., 178, 219, 225
- Capriano, Torbiera di, 363
- Carse whales, 265, 266
- Cartailhac, M., on Grimaldi skeletons, 167; on Cap-Blanc and Laussel sculptures, 237; and Reilhac exploration, 253
- Casale Zaffanella, terramara of, 327
- Casaroldo, terramara of, 306
- Cascina, Torbiera di, pile-dwelling at, 389
- Casks with iron hoops in terpen, 440
- Castelfranco, Prof., on terremare, 307; lacustrine remains, 353, 359, 360, 362, 369, 371, 373; burial customs of Lake-dwellers, 421
- Castellaccio, terramara at, 332
- Castellazzo di Fontanellato, terramara of, 310, 314; plan of settlement, 311; ritual trench, 312; relics from, 314
- Castelnovo Fogliani, terramara settlement, 319
- Castelnuovo, terramara at, 304
- Castione dei Marchesi, terramara at, 295, 303, 307; pottery from, 297; view of piles and woodwork at, 308; industrial remains from (illustrated), 310
- Cataragna, pile-dwelling at, 379
- Cavazzocca, A., and lacustrine exploration, 382; and Il Bor relics, 388
- Cave-bear, 31, 36, 40, 47, 66, 67, 72, 96, 122, 144, 161 hyæna, 31, 40, 66, 67, 91, 96, 147 lion, 66, 67, 144, 161, 178 wolf, 144, 147

- Cave and rock-shelter researches, of Le Moustier, 46; Aurignac, 47; Grotte du Trilobite and Les Cottés, 48; Monthaud, 52; La Madeleine, 53; Kent's Cavern, 58, 68; Windmill Hill Cave, 60; Cresswell caves, 60; Robin Hood and Church Hole caves, 61; Hyæna Den of Kirkdale, 62; West of England and Welsh caves 62; Goat's Hole and other Gower caves, 63-65; Grimaldi and Mentone, 65; Wookey Hole, 66; Veyrier, 69; Béthenas, 71; Freudenthal, 72; Kesslerloch, 73; Schussenried, 75; Schweizersbild, 77-79, 82; Cave of Bise, 91; Placard, 149; Hoteaux, 151; Moustier-de-Peyzac, 152
- Cavedoni on terremare, 303
- Cave-dwellers, 35, 36, 46, 54, 59, 69, 77, 93, 123, 127, 162, 183, 202, 242, 264, 414
- Caves, wall pictures of, 48, 207, 217, 218, 220
- Cavillon, grotte du, 160
- Celtic remains, 108
- Celts, of bronze, 301, 333, 337, 356, 357, 392, 467
of stone, 106, 350, 352, 367, 370, 377, 450
metallic, 354
winged, 333, 337, 356, 357
- Cemeteries of Castellazzo, 417; Pragatto, 417; Monte Lonato, 418; Bovolone, 418; Capezzato, 419; Casinalbo, 420; Trinità, 421
- Cervus elaphus*, 124
megaceros, 66, 123
tarandus, 123, 124
- Chamaison, M., 253
- Chancelade skeleton, 65, 133, 199; deposits (in section), 134
- Chantre, M., and Béthenas cave excavations, 71
- Chapelle-aux-Saints, skeleton from, 138; M. Boule on skull of, 139
- Chaplain-Duparc and Duruthy cave exploration, 146
- "Chasseur d'Aurochs," 239
- Chauvet, M., and La Quina station, 157
- Chelléen epoch, 40, 201; deposits, 40; flint industry, 86
- Chiavichetto, terramara of, 331
- Chierici, on terremare, 303-307, 320, 330, 332; his theory of terramara village structure, 304; on hut-dwellings and mixed stations, 401-403; on pile-structures, 432
- Chimpanzee, 11; brain of, 12; chin of, 19, 21
- Chin, evolution of, parallel with intellectual development, 19
- Chins of chimpanzee and modern Frenchman compared, 19, 21
- Chiron, M., 219
- Chisels, of bone, 48, 61, 80, 106, 263
of bronze, 299, 319, 327, 351, 356
of stone, 299, 359
- Christy, M., Le Moustier and La Madeleine excavations, 46, 53; and Laugerie Basse excavations, 132
- Church Hole Cave, 61
- Cilindro-retta*, 400, 406
- Clay bobbin, 467
buttons, 450
rings, 392
weights, 370, 371, 450, 447, 467
globular weight of (Butmir), 463
- Clichy skeleton, 142
- Cocchi, Prof., on Olmo skull and relics, 168
- Coffins (wooden) and human remains discovered at Donja Dolina, 472
- Cogozzo, terramara at, 329, 330
- Coins, 259, 292, 350, 351, 355, 382, 468
Anglo-Saxon, 440, 468
of bronze, 473
of potin, 473
- Colini, Prof., and lacustrine exploration, 379; on terramara settlements and hut-dwellings, 399, 400, 411, 415; on Dr Rosa's discoveries, 415
- Combarelles cave, 221; wall engravings, 222, 223
- "Combat de Rennes," 216
- Combe-Capelle, Aurignacien skeleton from, 136
- Combs, of bone and horn, 281, 298, 323, 331, 385; of bronze, 386; of wood, 371
- Commont, M., on Somme Valley flints, 43, 44; on relative deposits at Saint Acheul (diagram), 45; on flakes, 205
- Conelle, Le, hut-dwellings at, 413
- Conscious cerebration, 5

- Coppi, Prof., on *terremare*, 303, 324, 327
 Cordenons, Prof., and lacustrine exploration, 395, 396; on hut-dwellings, 405, 406
 Corn-grinders, 298, 352, 450
 Corn-mills (Bosnia), 464, and *note*
 Cotte, La, cave of (Jersey), 182
 Cottés, Les, cave of, 48
 Coup-de-poing, 30, 31, 32, 37, 38, 40, 41, 47, 60, 61, 69, 90, 136, 201, 203, 205
 Crahay, Prof., and Smeermass jaw, 103
 Cranial development, of man, 17, 22-24; of simian races, 90
 Crannogs, Scoto-Irish, 431
 Crayford, Palæolithic relics discovered at, 86, 87
 Creation, Biblical narrative of, 24, 102; the Gladstone and Huxley controversy, 24
 Cremation cemeteries, 293, 314, 354, 410, 417, 423, 470
 Crespellani, Sig., on *terremare*, 303, 322; cremation cemeteries, 420
 Crespellano, cremation cemetery, 410, 417
 Cresswell caves, 60
 Cretaceous period and extinct mammals, 6; evidence of birds and mammals, 9
 Crocefisso, hut-village at, 413
 Cro-Magnon cave, 127; skulls from, 131, 199
 Cro-Magnon race, 199
 Cromer forest bed, 85, 86
 Cumarola burial-place, 294
 Cumont, M., on terpen, 442
Cypræa, 163

 D'Acv, M. E., and skeleton of Hoteaux, 152
 Daggers, of bone, 279, 331, 352
 of bronze, 327, 337, 365, 378, 385, 412
 of mammoth rib, 175
 laurel-leaf blade, 405
 reindeer-hilted, 211
 with solid bronze hilt, 337
 Daleau, M., 207, 219
 Darbas, M., 253
 Dawkins, Prof. Boyd, on oscillations in relative levels of sea and land, 27; and remains of late Pleistocene animals, 27, 28; on glacial phenomena and contemporary mammalia, 33; and Cresswell cave discoveries, 60; and Hyæna Den investigations, 66; on ossiferous caverns in Pembrokeshire, 83; on Lombrive skulls, 154; on "Relation of Palæolithic to Neolithic period," 246
 Deer and bison, polychrome paintings of, 229
 Deer-horn, objects made of, 314, 391, 395
 Deer sculpture in stone, 53
 "Degeneration," Sir E. R. Lankester on, 7
 Demorta hut-dwellings, 403
 Denise, fossil man of, 95
Dentalium badense, 170
 Dentition (fossil jaws), 18, 19
 Denudation, 29
 Descent of Man, 89
 Desor on the structure of Isola Virginia, 349; and Lake Monate investigations, 358; Lake Maggiore, 362
 "Desor" or Del Moresco, lake-dwelling of, 355
 D'Estalas, grotte, 155
 Development of the senses, higher vertebrates and the lower animals, 8, 9
 Devonian period, 9
 Devonshire, bone caves of, 32
Diplodocus, *D. Carnegii*, 7
 Dirks, Mr, on terpen, 435, 438
 Discoidal stones of the *terremare*, 299, 382
 Discs, of mammoth tusk, 170, 171
 of amber, 410
 of stone, 391
 Dishes, 148, 358, 359, 364, 376, 396
 of bronze, 440
 fictile, 441
 turned on the wheel, 333
 Dolichocephalic skulls, 115, 134, 142, 146, 425, 426
 Donja Dolina, Pfahlbau of, 468; Dr. Ciro Truhelka and excavations in the "Gradina," 468-470; cemetery and urn-burials of, 470, 471; discovery of wooden coffins, 472; pottery from, 473; antiquities found on, 473
 Dordogne, the, 35; reindeer-hunters of, 69; the *Homo Aurignacensis Hausseri*, 137, 206
 Doré-Delente, M., on Bréchamps and Marcilly-sur-Eure skulls, 145

- Drift-men, 47, 205, 242
 Drill of bronze, 365
 Druiinvargie rock-shelter (Oban), 267;
 harpoons and shell-heaps, 267
Dryopithecus, 19; jaw of, 21; *D. fontani*,
 90
 Dubois, Dr Eugene, and discovery of
 remains of fossil man in Java (*Pithe-*
canthropus erectus), 184; contro-
 versy and criticisms, 190-195
 Ducrost, M., and Solutré excavations,
 51
 Dupont, Dr, on Solutré fauna, 52;
 Belgian caves investigations of, 116-
 123
 EARLIEST inhabitants of Europe, 202,
 203, 242
 Early man in the Forth Valley, 265
 Eburnean sculptures, 48, 207
 Eguisheim skull, 168
 Elephant, teeth of, 56; skeletons of, 56;
 African (Pleistocene), from Gibraltar
 caves, 180; hairy, incised on ivory,
 215
Elephas antiquus, remains of, 30, 31, 40,
 41, 42, 66, 85, 141, 166, 178
 meridionalis, 40, 41
 primigenius, 40, 41, 66, 123, 124
 Elk, the great Irish, extinction of, 8;
 contemporary with Neolithic man,
 105, 106, 154, 178
 Elliot, R., on Galley Hill skeleton, and
 gravel-pits, 109, 110
 Embryology, 9, 10; and evolution theory,
 10, 102
 Emilia, terremare at, 329, 330
 Enfants, grotte des, 165-167
 Engis cavern and skulls, 92
 Engravers of flint, 61, 96
 Engraving, art of, Palæolithic, 207, 214
 Eolithic implements, and existence of
 Tertiary man, 89
 Eolithic period, 38, 204
 "Eoliths," 38, 89, 204
 Epaulette, 357
Equus caballus, 123, 124
 Erect posture, and resultant anatomical
 alterations of man, 15, 16, 20
Ergeron clay, 44
 Etruscan remains, 293, 307, 407
 Evans, Sir Arthur, ou Mentone cave
 ornaments, 164
 Evans, Sir John, on Thames Valley flints,
 56; on E. T. Newton's paper on
 Galley Hill gravel-pits and skeleton,
 111, 112; on Hoxne flint "finds," 55;
 on the *hiatus* problem, 245
 Evolution, 3, 5, 9, 10, 15, 100, 102
 Eyzies, Carte des, 128
 FACIAL angle of Camper, 17
 Facial bones, retrocession of, 17, 19
 Fahrstedter Wurth, 446, 449
 Falconer, Dr, on immigration of fauna
 and land-bridges, 28; on pre-glacial
 deposits, 30; on molar of *Elephas*
antiquus, 30; on Somme Valley
 flints, 56; and Gower caves in-
 vestigations, 65; on Moulin-Quig-
 non jaw, 103; and *Homo Calpicus*,
 181
 Fannerup, shell-heap at, 281
 Farnè, grotta del, 409
 Faudel, M., on Eguisheim skull, 168
 Fauna (Pliocene), immigration of, 28;
 intermingling of northern and
 southern, 32, 33 (*note*), 34; Arctic
 and sub-Arctic, 79
 Favraud, M. A., on Petit-Puymoyen
 jaws and industrial remains, 147, 149
 Féaux, M., on Chancelade skeleton,
 133, 134
 Fées, grotte des, 96
 Felci, cavern of, 414
 Feldhofen cave, 96
Felis spelæa, 123
 Ferrassie, fossil men of, 139
 Ferry, M., and Solutré excavations, 51
 Fiala, Franz, on Butmir excavations, 458
 Fiastrì hut-dwellings, 402
 Fibulæ, 356, 357, 386, 387
 Hallstatt period, 467
 La Tène, 444
 leaf-shaped, 408
 Merovingian, 441
 Roman, 467
 "Ficrons," 40, 43
 Figurines, 440, 467
 goddess, 335
 of ivory, 48
 sculptured from reindeer-horn, 123
 Filhol, M., and Lombrive cave, 154
 Fimon, L., lake-dwellings in, 390
 Fish-hooks, of bone, 279; of bronze, 353,
 356, 360

Fish-spears, 273
 Flakes, introduction of, 38, 44, 59, 61, 69, 163; triangular, 32
 Flint implements, earliest forms of, 28, 29; from Thames Valley, 30; Hoxne, 32; Eolithic and Neolithic, 38; formation of the coup-de-poing, 38; Chelléen, 40; Acheuléen, 39, 42; Moustérien, 46; Aurignacien, 47; Solutréen, 51; Hoxne, 32, 55; Magdalenien, 53; specimen from Gray's Inn, 56; from Somme Valley, 143; Levalliois-Perret industry, 43; of Mammoth and Reindeer periods, 117; Goyet and Mesvin specimens, 123; Campignien and Tardenoisien industries, 277; tranchet, an implement of transition period, 277-278
 Floats, perforated, for nets, 353, 365, 368
 Florestan, grotte de, 160
 Flute of bone, 441
 Fondouce, M., on the *hiatus* problem, 244
 Font-de-Gaume cave, 224; wall paintings of, 224, 225
 Fontega, Valley of, novel objects from, 393
 Forchammer, M., on kjökkenmöddings, 280
 Forli, hut-dwelling at, 411
 Forsyth Major on Olmo skull, 168
 Forth Valley, evidence of prehistoric man, 266; hammer-axe head, 265; shell-heaps of, 266; Sir W. Turner's paper on, 266; the Carse whales, 265, 266
 Fossil ancestors, 4, 5, 6
 Fossil jaws. See Jaws
 Fossil Man (geographical distribution)—
 Early records: Defined, 88; Missing Links, 89; simian cranial development, 90; Cave of Bise relics, 91; Dr Schmerling's Engis Cavern discoveries, 92; the Lahr skeleton, 94; fossil bones of Denise, 95; Arcy-sur-Cure jaw, 96; Neanderthal and Canstadt skulls, 96, 102; Smeermass jaw, 103; Moulin-Quignon and Malarnaud human mandibles, 103, 104
 Britain: Ballynamintra cave relics, 105, 106; Tilbury skeleton, 106; Bury St Edmunds skull, 108; Galley Hill skeleton and skull, 109, 114

Fossil Man—*continued.*

Belgium: Dr Schmerling's early discoveries, 92, 93, 116; Dr Dupont's investigations and classification of relics, 116, 117, 118; Trou de la Naulette jaw, 118, 119; Trou du Frontal skulls, 121; human remains of Goyet, Trou Magrite, and Trou du Sureau caverns, 122, 123; the Spy skulls, 126
 France: M. L. Lartet's researches, 127; Vézère Valley, Cro-Magnon cave, and skeletons, 128; skull of "old man" of Cro-Magnon, 131; Laugerie Basse skull and skeleton, 132, 133; Chancelade skull, 133; skulls of *Homo Mousteriensis* and *Homo Aurignacensis*, 136, 137; skeleton of Chapelle-aux-Saints, 138; fossil men of La Ferrassie, 139; Grenelle skeletons, 141; Clichy skeleton, 142; Race de la Truchère, 143; Malarnaud jaw, 144; Marcilly-sur-Eure and Bréchamps skulls, 144; Duruthy cave, 146; jaws of Petit-Puymoyen, 147; Placard skull, 149; Barma Grande cave skull, 150; Hoteaux skeleton, 151; Moustier-de-Peyzac skeleton, 152; Bruniquel remains, 153; La Quina skeleton, 155
 Jersey: La Cotte cave relics, 182; Pleistocene man of, 182
 Italy: Caves of Grimaldi, skeletons and skulls from, 159-160; the famous *l'Homme de Menton*, 160; excavations of M. de Villeneuve, 160; M. Rivière's researches, 161; the du Cavillon skeleton, 161; skulls from Grotte des Enfants, 165, 166; the Olmo and Egusheim skulls, 168; Brünx skeleton, 169; Brünx skeleton, 169, 171
 Bohemia: the Podbaba skull, 172; skeletons, 173
 Moravia: Predmost cemetery skeletons, 174; Fürst Johanns Hole skull, 175; Sipka jaw, 176
 Krapina: Rock-shelter (in section), 176; relics, 177; human remains, 177
 Heidelberg: Human mandible, 179

Fossil Man—*continued.*

- Gibraltar*: Caverns of, 179; Captain Brome's researches, 179; the famous skull, 180. (See also *Pithecanthropus erectus*)
- Four-horned sheep, 441
- Fox, General Lane, on flint implements, 32
- Fraipont, Prof., Palæolithic period classification of, 39; on Spy skull, 125
- Franks, Mr A. W., 56
- Frasassi, cave of, antiquarian remains of, 413, 414
- Frass, Dr, and Schussenried investigations, 76
- Frere, John, on flint "weapons" found at Hoxne, 55
- Freudenthal, cavern of, 72
- Friesland, terpen of, 433-444
- Fritsch, Dr, on Podbaba relics, 172
- Frontal, Trou du, 120; vase (reconstructed) found in, 122
- Fuhlrott, Dr, and Neanderthal skeleton, 96, 97
- Funeral pyres, 324
- Furfooz, caves at, 116
- Fürst Johannis Hole, 174; skull from, 175
- GALLEY Hill, skeleton of, 109; chalk and gravel pits (diagrammatic), 111; Palæolithic flint implements, 112; skull, 114
- Galli Anani and Galli Boi, 293
- Garda, L., lake-dwellings of, 380, 429
- Garigou, M., and Lombrive cave, 154
- Garson, Dr, on Galley Hill skull, 115
- Gastaldi, Prof., on Cumarola burial-place, 294; and lacustrine exploration, 364, 367
- Gaudry, Prof., on development of the chin, 19, 21; on Petit-Puymoyen mandible, 148
- Geikie, Prof. James, on Glacial Epochs, 27; the Palæolithic epoch and climatal changes, 33; and distribution of flora and fauna, 33, 34, 35; on Thames Valley "drifts," 42
- Geology, Quaternary deposits, 26
- Geometric ornaments, 174, 235
- Gervais, M. P., and Béthenas skull, 71
- Giacometti, Dr, on terramara of Mantua, 330
- Gibraltar caverns, 179; skull, 180; fauna, 180, 181
- Glacial epoch, 26, 27, 85; Alpine and Rhone glaciers, 27; oscillations in relative levels of sea and land, 27; inter-glacial period, 28; contemporary mammalia of, 32, 33
- Glacial phenomena and Man, 26, 68, 85
- Glaciers, 26, 27
- Glass, beads, 440
- necklace, 445
- slag, 440
- Glastonbury lake-village, 282, 431
- Goat, engraving of, 223; head of, incised on stone, 235
- Goat's Hole cave, 63
- Godwin-Austin on Kent's Cavern, 58
- Gold, coins of, 440
- Merovingian ornament, 444
- Gorilla, 11; brain of, compared with Man's, 12
- Gorzano, terramara of, 324; plan of, 325
- Gottolengo, terramara of, 331
- Gower caves, 65; Bosco's Den and Long Hole, 66
- Goyet caverns, 122
- Gozzadini, Count, and cemetery of Crespellano, 417
- "Gradina" (Donja Dolina), excavations at, 469-472
- Gramizzi, Sig., on Salso Maggiore marlbeds, 293
- Gray's Inn Lane, flint found in, 56
- Grenelle gravel-pits and skeletons, 141, 142
- Grimaldi caves, 159, 166
- Guillon, C., and Hoteaux rock-shelter, excavations at, 151
- HAECKEL on Evolution, 10
- Hairpins of bronze, 356, 357, 359
- with amber heads, 385
- Hammer-axe head, 265
- Hammer-stones, 59, 69, 77, 106, 169, 352, 377, 397
- of Alpine pebbles, 69
- Hammers (perforated), 148, 451
- of staghorn, 450, 451
- Hamy, M., on Béthenas skull, 72; on Naulette jaw, 120; on Laugerie Basse skull, 133; on Olmo skull, 168; on Clichy skull and Seine deposits, 142, 143; on Placard skull, 150; on Gourdan cave remains, 154

- Hardy, M., on Chancelade skeleton, 133, 134
- Harpoons, 59, 77, 80, 122, 147, 150, 210, 251, 252, 253, 255, 256, 264, 268, 273, 357; sporadic finds of, at Newcastle-upon-Tyne and Kirkcudbright, 270; Neolithic, distribution of, 271
- Hartmann on structure of Wurthen, 445
- Hatchets, of bronze, 359
of iron, 322
of serpentine, 331
of stone, 357, 358, 359
- Hauser, M. O., and Le Moustier and Combe-Capelle excavations, 135, 136
- Hearths, 47, 80, 159, 173, 336, 396, 472, 473
- Heidelberg mandible, 179, 197
- Helix nemoralis*, 251; *hortensis*, 252
- Hervé, M., on Placard skull, 150
- Higher vertebrates, 8
- Hippopotamus, disappearance of, from Europe, 41
- Hippopotamus major*, 31, 40, 42, 85, 167
- Hoernes, Dr Moriz, on the Butmir excavations, 458
- Holmes, T. V., on Tilbury skeleton, 108
- Hominidæ*, 9
- Hommes de Spy*, 123
- Homo Aurignacensis*, 136; skulls, 136, 137
Calpicus, 181
Heidelbergensis, 178, 179, 197
Mousteriensis Hauseri, 135
- Hoogebeintum, terp of, 443
- Horn and bone implements of the terre-mare, 299
- Horse, a "terminal form of life," 14; fossil remains of, 72, 76, 147, 154, 178; drawings of, on reindeer-horn, 74; ivory figurine of, 211; engravings of (on cave walls), 212, 220, 221, 222, 231
- Hoteaux rock-shelter, 151; skeleton of, 151, 152
- Hoxne, flints found at, 32, 55; brick-earth, 84; the B. A. investigation at, 84
- Human remains, 46, 47, 52, 65, 71, 72, 79, 91, 95, 153; in terramara, 323
- Hungary, pile-structures in, 430, 450
- Hut-dwellers, Neolithic, and the Terramaricoli, relation between, 398
- Hut-dwellings and foundations, 401, 402, 405, 407, 408, 411, 413, 415
of Campigny, 275
- Huts of Taranto, 336
- Huxley, Prof., on rudimentary organs, 10; on the "Creation," 24; on the Engis skull, 92, 93; the Neanderthal, 23, 99; his "Man's Place in Nature," 100, 101; on the Palæolithic and Neolithic *hiatus*, 245
- Hyæna cave, animal remains in, 59
- Hyæna Den of Kirkdale, 62; of Wookey Hole, 66
- Hyæna spelæa*, 124
- Hydraulics and pile-dwellings, 306, 398
- Hyphnum sarmentosum*, *H. grænladicum*, at Schussenried, 76
- ICE Age, the Great, 26, 27, 30
- Ichthyosaurus*, 6
- Idols, of Butmir, 459, 463
of clay, 338
of mammoth tusk, 171
- Iguanodon*, 7
- Il Bor, remains of pile-dwellings, 382, 388
- Imola, hut-dwelling at, 411
- Inchkeith shell-heaps, 269
- Inkwyl, Lake of, 431
- Invertebrata, 9
- Ireland, Pleistocene fauna of, 105; Ballynamintra cave relics, 105, 106
- Iron objects, 322, 331, 440, 444, 445
- Iseo, Torbiera d', lake-dwelling at, 373
- Isola Virginia (Camilla), lake-dwelling at, 349
- Ivory objects, 48, 125, 171, 174, 211, 239
ornaments from Ojcow, 257
- JADE, celts of, 352, 357
chisels, 357
hatchets, 358
- Jaeger, Mr, on Canstadt skull, 103
- Jarricot, J., on the Béthenas skull, 72
- Java, Dr E. Dubois' discovery of fossil remains of man (*Pithecanthropus erectus*), 184; Trinil bone-mine and strata of, 185
- Jaws, profiles of various, 20, 21; Spy, 18; Arcy-sur-Cure, 20, 96; Naulette, 18, 119; Malarnaud, 144; Petit-Puymoyen, 147; Sipka, 176
- Jersey, evidence that island was part of mainland of Europe, 183; Pleistocene man in, 182; Palæolithic and La Cotte caves, 83, 182, 183
- Jerzmanowice cave, 258

- Jezerine, flint steel found in necropolis of, 467
- Julien, M. L., and Barma Grande skeleton, 151, 163
- KALÆVIG, shell-heap at, 281
- Kallay, von, his Excellency, and Butmir excavations, 455
- Karsten, Dr. and Freudenthal Cavern excavations, 72
- Keith, Dr. on the Gibraltar skull, 181
- Kent's Cavern, 58, 68; Rev. J. MacEnery, and Godwin-Austin's researches in, 58; W. Pengelly's investigations, 58, 59
- Kesslerloch cave, 73; animals and ornaments from, 74, 75; Rutymeyer's tabular statement of osseous remains in, 75
- Kirkdale Hyæna Den, 62
- Kjökkenmøddings of Denmark, 279, 280, 294; implements found in, 280; Prof. Steenstrup's deductions from osseous remains, 283, 284
- Klaatsch, Prof., on Le Moustier skeleton and Dordogne race, 135, 137
- Knife, flakes, 31, 47, 361
of bronze, 319, 353, 385, 387, 450
of flint, 30, 47, 61, 69, 71, 96, 148, 371
one-edged, 337
with bone handle and amber head, 106, 327
- Kollmann, Prof., on the Schweizersbild fauna, 78; skeletons, 81
- Kostersitz, Capt. von, and lacustrine exploration, 381
- Kozarnia cave, 258
- Kramberger, Dr K., and Krapina explorations, 177
- Krapina rock-shelter (in section), 176; industrial remains and fauna of, 177; human remains, 178
- Kuczorgó mound, terramara of, 450
- LACAVE, station of, 209
- Lacustrine station, a floating island, 279
- Lagazzi, pile-dwelling at, 371
- Lagopus alpinus*, 173
- Lagozza, lake-dwelling in, 368
- Lahr skeleton, 94
- Lake-dwellers (Western), burial customs of, 421; and the Terramaricoli, the racial problem, 423
- Lake-dwellings, 346, 347, 358, 360, 361, 362, 363, 367, 368, 371, 373, 374, 379-380, 389, 390, 392, 394
- Lalanne, Dr. and Cap-Blanc sculptures, 234, 236, 237
- Lance-heads, 56, 70, 209, 211
of bronze, 293, 356, 363
of flint, 51, 76, 147, 380
of horn, 53, 76, 147
of stone, 76, 209, 377
laurel-leaf shape, 208, 209, 389, 394
with wedge-shaped slit, 210
- Land-bridges, and immigration of fauna, 28, 105
- Lartet, Prof. E., on Palæolithic classification, 38; and Moustier cave investigations, 46; La Madeleine, 53; Cro-Magnon cave, 127; Duruthy cave, 146; La Madeleine skeleton, 154
- Lastic, Vicomte de, and Bruniquel skeletons, 154
- Laugerie Basse rock-shelter, 132; skeleton from, 132, 199; painting and sculpture of, 238, 239
- Laugerie Haute rock-shelter, 132
- Laussel sculptures, 237
- Lecco, Lake of, palafittes in, 362
- Leptabos, extinct genus of, 186
- Leptorhine rhinoceros, 63
- Les Eyzies, human mandible at, 154
- "Levallois flake," 43, 205
- Liguri (or Ibero-Liguri) people, 354, 425, 428
- "Limandes," flints, 40, 43
- Lime-kiln, primitive, 323
- "Limon fendillé" clay, 44
- Lioy, Mr. and exploration of Lake Fimon, 390, 392
- Littorina littorea*, 161
- Loë, Baron A. de, on Tardenoisien flints, 278
- Lohest, M., and Spy skeletons, 124
- Lombrive cave and skulls, 154
- Loom-weights, 414, 439
- Lorenz, M., and exploration in Lake Garda, 380
- Lorenzi, Abri of, 159
- Lorenzi, M., and Grimaldi caves, 160
- Lorenzoni, Dr Riccardo, and Nicolucci cave exploration, 416
- Lunata* and *cilindro-retta* handles, 412

- Lyell, Sir C., on Ouse Valley and flint deposits, 31 ; on mammalian remains of Thames Valley, 42 ; on Aurignac grotto remains, 47 ; on Gower cave discoveries, 66 ; on Lahr skull, 95 ; on Denise fossil bones, 96 ; his *Antiquity of Man*, 99 ; on Dr Schmerling and Boué's discoveries, 94, 95, 96 ; on Feldhofen cave, 97 ; on the Smeermass jaw, 103
- MACARTHUR cave (Oban), Dr J. Anderson on deposits of, 261 ; bone and horn implements, 262, 263 ; shell-beds, 264
- Machairodus latidens*, 59, 61
- Madeleine, La, rock-shelter, 53, 154
- Magdalénien epoch, Palæolithic stations of, 69-77, 122, 201 ; people, 53
- Magdalénien Race, 198
- Maggi, Prof. Leopoldi, 361
- Maggiolino, Torbiera di, lake-dwelling at, 363
- Maglenose, 279
- Magrite, Trou, cavern, 122
- Makowsky, A., and Brunn excavations, 170 ; skeleton, 176
- Malarnaud cave, and jaw from, 104, 144
- Mammalia contemporary to glacial phenomena, 33
- Mammalian remains, 31, 56, 57, 58, 59, 61
- Mammals, Living and Extinct*, and, Arctic remains (quoted), 88
- Mammoth cave of Ojcow, 257
- Mammoth period, relics of (Belgium), 117
- Mammoth remains, 27, 31, 41, 49, 56, 57, 64, 66, 67, 92, 96, 119, 141, 170, 173 ; in Arctic regions, 88
- Mammoth skeleton (Siberian), 214 ; incised figure of, 215
- Man, first appearance of, on field of life, 3, 9 ; traditions and myths, 3 ; doctrine of organic evolution, 3, 10, 102 ; his career as *Homo sapiens*, 4, 14, 16, 90 ; and fossil ancestors, 4, 5, 89 ; degeneration, 7 ; line of ascent, 9, 11 ; embryology and evolution, 3, 9, 10, 100, 101 ; rudimentary organs, 10 ; and anthropoid apes, 11 ; transition from the higher apes indefinite, 11, 90, 101 ; morphological changes, 11, 15 ; brain of, and anthropoid ape, compared, 12 ; erect posture and bipedal locomotion, 15, 16 ; cranial development and cerebral activity, 17, 22-24 ; formation of chin parallel with intellectual development, 19 ; lines of investigation, 20 ; Prognathism, 22 ; Creation, Biblical narrative, 24, 102 ; antiquity and early history, 26, 55, 57, 92, 101 ; Palæolithic, 35, 38 ; and Stone Age, 38 ; and Glacial epoch, 36, 26-39, 68 ; caverns first inhabited by, 36, 39, 46, 69, 77 ; descent of, 89 ; "missing links," 89, 189
- Mandibles (human), 18, 19, 103, 104, 148, 154, 155, 178, 179
- Manouvrier, M., on Moustérien flints, 126 ; on the Bréchamps skull, 145 ; Moustier-de-Peyzac skeleton, 153 ; on *P. erectus*, 194
- Man's Place in Nature* (quoted), 92
- Mantovani on terremare, 305
- Mantua, terramara settlements of, 330
- March, Dr Colley, on Neolithic floors, 278
- Marche and South Italy, hut-dwellings of, 413
- Marcilly-sur-Eure and Bréchamps skulls, 144
- Marendole hut-dwellings, 405
- Maret, M., and Placard cave explorations, 149, 150
- Mareuil, flint-bearing deposits, 30
- Marine dwellings (ancient), on the coasts of Holland and Western Germany, 433
- Marinoni, D. Camillo, on terremare, 331 ; and lacustrine exploration, 349
- Mars, bronze figure of, 444
- Marsoulas cave, 229
- Martin, Dr Henri, and La Quina skeleton, 155, 157
- Martin, M. Emile, on Grenelle gravel-pits and skeletons, 141
- Martinati, Cav., and lacustrine exploration, 382, 389
- Mas-d'Azil cavern, 249 ; bone and flint implements from, 250, 251, 252 ; skeletons, 65, 251, 276 ; harpoons of red-deer horn in, 253
- Masè, A. F., and Demorta explorations, 403

- Maska, Dr Karl, and Predmost explorations, 173, 176
- Massénat and Laugerie Basse skeleton, 132, 133
- Mautort, flint deposits, 30
- Mediterranean Sea, level of, during interglacial period, 28
- Meilgaard, shell-heap at, 281
- Meles taxus*, 124
- Mello, Rev. J. M., and Cresswell caves discoveries, 60
- Menchcourt, flint deposits, 30
- Mental development, 17
- Mentone sepulchral caves, 65, 164
- Mer de glace*, 27 *et seq.*
- Mercurago, Torbiera di, lake-dwelling at, 364
- Merk, Mr., and Kesslerloch cave excavations, 73
- Merovingian graves in terpen, 441
- Meschinelli, Dr Luigi, and lacustrine exploration at Fòntega, 392-394
- Mesnil, du M. Dault, discoveries in Somme Valley, 43
- Mesopithecus pentelici*, 90
- Mestorf, Fraülein, and Kuczorgó mound, 451
- Mesvin, flint implements from, 123
- Metal slag in terremare, 300
- Meyer, Von, on dendritic crystallisations, 98
- Mezozoic (Lower) period, 9
- Milne-Edwards, M., on Moulin-Quignon jaw, 104
- Mincio, pile-dwellings of, 383, 386
- "Missing links," 89, 189
- Molars of Pachydermata, 41
- Mollusca, little change from Palæozoic times, 6, 7; sense of smell, 8
- Mombello, Torbiera di, lake-dwelling at, 360
- Monaco, Prince of, and *Les Grottes de Grimaldi*, 149, 161 (*note*)
- Monate, L., lake-dwellings in, 358
- Montale, terramara at, 322; relics, 324
- Montata dell' Orto, terramara of, 316; plan of, 317; moat rampart and ritual pits, 318; relics, 319
- Monte Castellaccio, 411
- Monte Venere, terramara of, 305
- Monthaud rock-shelter, 52
- Montières, flint-bearing deposits at, 30
- Monza, cremation burials of, 422
- Morphological changes of man, 6, 13, 15
- Mortillet, G. de, on Chelléen deposits, 30, 40; on mammalian migration, 33; his classification of Palæolithic remains, 38, 39; on Man's relation to Glacial epoch, 85; his *Les Matériaux pour l'histoire primitive et naturelle de l'homme*, 101; on the Grenelle skeletons, 141; on Eure skull, 145; on Placard skull and Hoteaux skeleton, 151, 152; on Feldhofen cave, 97; on Predmost sepulchre, 174; on *P. erectus*, 191; on the transition period, 243; on terremare, 346; and lacustrine exploration, 358; on Neolithic station of Butmir, 461
- "Mother Grundy's Parlour," 61
- Moulds, 302, 327, 350
- Moulin des Liesberg, 274
- Moulin-Quignon, flint-bearing deposits, 30
- Moulin-Quignon jaw controversy, 103, 104
- Moustérien epoch, 35, 46, 183, 204
- Moustier cave, 46, 69
- Moustier-de-Peyzac, female skeleton discovered at, 152
- Mouthe, La, cave explorations and wall decorations of, 219, 220
- Munro, Dr R., on "Palæolithic Man—Artist and Sportsman," 247
- Mural paintings on cavern walls, 218
- Musk-ox, carved head of, 74
- Myodes torquatus*, 80
- Nassa neritea*, 161, 164
- "Natural Selection," 100
- Naulette, Trou de la, 117; jaw, 119
- Neanderthal skull, 23, 96; dimensions of, 98; Virchow on, 102
- Neanderthal-Spy race, 197; distribution, 198
- Necklets, of amber beads, enamel, coloured glass, and cowrie shells, 473
- of canine teeth, 147, 164, 170, 250, 260
- of conical beads of vitreous paste, 366
- of glass, 445
- of shells, 130, 164, 260

- Needles, of bone and horn, 59, 61, 67, 70, 74, 77, 80, 122, 150, 209, 214, 273, 279, 351, 439, 468
 of bronze, 327, 373
 of oakwood, 77
- Negroid skeletons, 200
- Nehring, Prof., on the Schweizersbild deposits, 78; his table of fauna, 79; on fauna of the Tundra, 80
- Neolithic period and Man, 38. Burials, see Palæolithic
- Nephrite, hammers and axes of, 373
- Nerita littoralis*, 64
- Newton, E. T., on Galley Hill skeleton, 109
- Niagara Falls, recession of, 68
- Niaux cave (*La Grotte des Forges*), 230; freehand drawings in, 231; pictographic inscriptions and animal drawings, 232, 233
- Nicolucci, cave of, 416
- Nuclei, with facets, 47, 148, 270
- Nüesch, Dr, on the Schweizersbild fauna and rock-shelter, 78, 81, 82, 273
- Nutons, Trou des, 120
- OBAN cave and troglodytes, 264
- Obi lemming, 80, 81
- Obsidian, flakes of, 174, 353, 450, 451
- Occhio, lake-dwelling at, 360
- Ochre paintings, 209, 224
- Offida (near Piceno), lacustrine station at, 333
- Ofnet cave, 259; skulls from, 260
- Ojcow bone-caves, 256; the mammoth cave, 257; ivory ornaments from, 257, 258
- Olmo skull, 168; lacustrine deposit and relics, 168
- Oppidum, Roman, Canstadt skull found in, 103
- Orang, 11; brain of, 12
- Orefici, Sig. F., and lacustrine exploration, 371
- Organic evolution and man, 3
- Organic life, past and present, 3-9
- Organic world, Man's place in the, 3, 4
- Organisms, somatic structure of, 6; and "terminal forms" of life, 6; species which have resisted all evolutionary movements, 6, 7
- Origin of Species*, 100
- Ornamented caverns and sculpture (Palæolithic), 48, 217, 218
- Ornaments resembling double-eggs, from Mentone caves, 164; of ivory, 171, 174; of Tertiary shells, 174
- Oronsay shell-heaps, 268; bone and horn implements, 268
- Orsi, Prof., on *ansa lunata*, 424
- Orsi, Sig. F., on La Grotta del Farnè, 409
- Oscillations, in relative levels of sea and land, 27, 28; and chronological problems, 83; submergence of land, 83; British Isles once integral part of the Continent, 83, 105; submerged forests, 83, 85. (See also Land-bridges)
- Ouse Valley (in section), showing relation of flint implements to boulder clay, 31; mammalian remains discovered in, 31
- Ovens of clay, 472, 473
- Owen, Prof., 22; on Tilbury skeleton, 106; and Bruniquel skeletons, 153
- PACENGO, Porto di, remains of pile-dwelling at, 382, 388
- Pachydermata and mammalia, extinction of, in Central Europe, 28, 35; molars of, 41
- Painting, art of, and Aurignacien epoch, 207
- Palæolithic and Neolithic burials, 132, 135, 146, 151, 152, 162, 167
- Palæolithic and Neolithic civilisations, transition between: the *hiatus* problem, and the evidence, 241-249; De Mortillet and Prof. Huxley on, 244, 245; Prof. Dawkins and Dr Munro on, 246, 247
- Palæolithic "floors," 86
- Palæolithic hunters, and art remains of, 53, 61, 63, 122, 154, 202
- Palæolithic industrial remains, De Mortillet's classification, 38, 39
- Palæolithic man, first appearance of, in Western Europe, 35; works of, correlative to Glacial period, 84, 85
- Palæolithic period, Prof. Fraipont's classification of, 39
- Palæolithic races of Europe: physical characters, 197; their arts and industries, 200-240
- Palæoliths, discovery of, at Abbeville, 42

- Palafitta barbarica*, 345
- Parat, Abbé, Grotte du Trilobite discoveries at, 49; of engraved woolly rhinoceros, 49, 207
- Parazzi, Arciprète, on terremare, 327, 329, 330; on hut-dwellings, 371
- Parma, terremare of, 303; view of piles *in situ*, 308
- Pavement, Roman, 329
- Paviland skeleton, 63, 65, 196; burial customs, 65
- Peet, T. Eric, on hut-dwellings, 399, 400, 407; on Marendole handles, 411
- Pembrokeshire, bone-caves of, 83
- Penck on Glacial epochs, 27
- Pendants, of agate, 53
 of amber, 357
 of bronze, 314, 368, 371, 374
 of coal, 74
 of fluorine, 122
 of green steatite, 371, 374
 of ivory, 53, 130, 164
 ornamented with concentric dot and circles, 468
- Pengelly, W., and Kent's Cavern investigation, 59; Windmill Hill, 60; on submerged forest of Torbay, 84
- Peroxide of iron, 65, 162
- Perthes, M. B. de, archæological discoveries of, at Abbeville, 42; in Somme Valley, 56, 99
- Pertosa, grotta di, palafitte in, 415; pottery from, 416
- Peschiera, lake-dwelling at, 384
- Petit-Puymoyen, human jaws found at, 147; fauna of, 147, 148
- Peyrille, M. R., and Cap-Blanc exploration, 234
- Peyrony, M., and La Ferrassie skeletons, 139, 140
- Pfeffer, Dr., on animal remains in wurthen, 447
- Picks of flint, 279
- Piette, M. Ed., on Eburnean sculptures, 48, 207; and Mas-d'Azil excavations, 249
- Pieve, La, hut-village at, 413
- Pigorini, Prof., on terremare, 296, 302, 303, 306, 307, 309, 312, 320, 333, 337, 344, 345; and lacustrine explorations, 379, 389; on the Frassassi cave "finds," 414; urn cemeteries discovered by, 417, 418; on the racial problem, 423; on the Liguri people, 428; on terpen, 435, 444; on the Kuczorgó mound, 450; on the supposed hut-foundations at Butmir, 455, 457
- Pile-structures at Ripac, 464; in Hungary, 450; Donja Dolina, 469-472. (See also Lake-dwellings)
- Pincers, 408
- Pins, of bone, 48, 59, 262
 of bronze, 299, 327, 356, 364, 380, 387, 412, 450
- Pithecanthropus erectus*, the Java remains, 184; skull, 187; femur, 188; Dr Dubois' theory that *P. erectus* a transitional form between man and ape, 189
- Pithecoïd giant child, 176
- Placard, cave of, 149; Palæolithic relics from, 149; skull, 150
- Plaques, of bone, 74, 410
 of ivory, 214
 of sandstone, 122
 of schist, 77, 174, 215; with incised figures, 49; with classic engravings, 215
- Pleistocene man in Jersey, 182
- Plesiosaurus*, 6
- Pleyte, Dr., on terpen, 438, 444
- Pliny on the Chauci, 433
- Pliocene Age, climatic conditions of, 26; mammalia of, 33-36
- Pliocene mammalia migrations, and climatic changes, 33; fauna, 105
- Po Valley, and distribution of terremare in, 341
- Podbaba skull, 172
- Pointers, of bone and horn, 138, 273, 331, 351, 431
 of flint, 69, 156
 from radius of deer, 161
 split at the base, 47, 48, 123
- Pointes à cran*, 208, 209
- Polada, lake-dwelling at, 374
- Polychrome paintings, 218, 227, 229
- Ponte del Goro, 413
- Ponti, Sig. Ettore, and lacustrine exploration, 350, 351, 355
- Portugal, shell-heaps of, 284; implements found in, 284; osseous remains, 285
- Pottery, Roman, 59, 61, 328, 444
 Bosnian specimens, 406

- Pottery, Castellazzo, Enzola, Castione, and Poviglio specimens, 297
 Neolithic, 91
 South Italian specimens, 416
 vase (reconstructed) from Trou du Frontal, 122
 from Butmir, 462, 463
 from Campigny, 276, 297
 from cave-dwellings, 409, 413, 415, 416
 from Donja Dolina, 473
 from hut-dwellings, 404, 411-413
 from lake-dwellings, 352, 357, 365, 368, 385, 391-395
 from Pertosa grotto, 416
 from terramara settlements, 297, 314, 323, 330, 333, 337
 in terpen, 439, 447
 Pozzolo lake-dwelling, 359
 Pragatto, terramara of, 410
 Predmost cemetery, 173
 Prestwich, Dr J., on Somme and Ouse Valley flints, 31, 56
 Prevosta hut-dwellings, 411
 Prigg, H., and Bury St Edmunds skull, 108
 Prince, grotte du, 85, 160, 167
 Prognathism, 22
 Protozoa, 6
 Pruner-Bey, on the Lahr bones, 95; on skeletons of Trou du Frontal, Grenelle, and La Truchère, 121, 141, 143
Pterodactyle, 6, 13
Purpura lapillus, 161
 Pusiano, Lake of, pile-dwelling in, 363
 Pustenga turbary, 358
 QUAGLIATI, Prof. Q., discovers a terramara settlement at Taranto, 335; on pile-structures, 356
 Quaternary geology, 26; flints, 56, 204
 Quaternary times and Britain, 286
 Quatrefages, M. de, on the Grenelle skeletons, 142; La Truchère skull, 143; on Olmo skull, 168
 Quern-stones, 368, 404, 447
Queue de poisson amulet, 213
 Quina, La, skeleton, 155; site of station (diagrammatic), 156, 157; bone implements of, 206
Race de Grimaldi, 165, 200
 Radimsky, Mr B., and excavations at Butmir, 452-458; and explorations at Ripac, 466
 Rambotti, Dr Giovanni, on lacustrine exploration, 375-379
 Rames, M., and Lombrive cave, 154
 Ranchet, Abate, and lacustrine exploration, 349, 350, 358
 Ranchet, lake-dwelling of, 356
 Razor (double-edged) of bronze, 337, 408
 Red Woman of Paviland, 196
 Regazzoni, Prof., and lacustrine exploration, 351, 355, 369
 Reignault, M., discovers human mandible, 155; on cavern wall-pictures, 229
 Reilhac, grotte de, 253; deposits of, 254; implements from, 255, 256
 Reinach, M., and Butmir investigations, 458; quoted in Preface
 Reindeer Age of France, 69, 116, 198; Belgium, 117
 Reindeer, drawings of, on horn, 74, 123, 151, 154; incised on schist plaque, 215; on wall of Combarelles, 223
 Reindeer-hunters, of the Dordogne, 69; of France, 77, 120; objects illustrating progressive skill of, 53, 54, 117
 Reptiles, first appearance of, 9
Rhinoceros hemitechus, fossils and remains of, 66, 141; *R. etruscus*, 178; *R. merckii*, 40, 41, 42, 43, 47, 85, 167, 177; *R. tichorhinus*, 31, 66, 123, 124, 161
 Ribeiro, M. A., on shell-heaps, 284
 Rigollot, Dr, on gravel pits of Saint Acheul, 42
 Rings, of ivory, 59
 of bronze, 345
 of clay, 392
 perforated, 395
Rinnekalns of Finland, 273
 Rio, M. Alcade del, and Altamira cave explorations, 227
 Ripac, pile-structure at, 464; site of the Pfahlbau, 465; characteristic relics from, 467
 Ritual pits, 312, 316, 318, 320
 Rivière, Emile, and discovery of female skeleton at Moustier-de-Peyzac, 152; and Grimaldi caves researches, 159-162; on La Mouthe, ornamented cave of, 219; and Cap-Blanc excavations, 234
 Robin Hood Cave, upper canine of sabretoothed lion found in, 61; "Mother Grundy's Parlour," 61

- Rocca di Garda, remains of pile-dwelling at, 382
- Rochebrune, M. R. de, the cave of Les Cottés explored by, 49
- Rock-sculptures, 221, 234-237
- Rods of ivory, 59, 64
- Romain, M., on tranchets, 277
- Roman coins. See Coins
- fibulæ, 440
- statue, 448
- Romei hut-dwellings, 401
- Romer, Dr, on Tószeg excavations, 451
- Römer, Prof., on Ojcow mammoth cave, 257
- Rosa, Dr C., and Vibrata Valley researches, 414
- Rostrate*, vase handles, 406
- Roteglia, terramara of, 306
- Roule, M., discovers human mandible, 155
- Rovere di Caorso, terramara of, 315 ; plan of, 315 ; ritual pits, 316
- Rubbers, stone, 298
- Ruffoni, Sig. Francesco, on lacustrine exploration, 374
- Rutmeyer's table of osseous remains of Kesslerloch cave, 75
- SABBIONETA, terramara at, 330
- Sabione, lake-dwelling at, 359
- Sacken, Dr E. F. von, and lacustrine exploration, 381
- Sacrifices, human, 293
- Sacrificial knives, 208
- Saint Acheul, flint-bearing deposits, 30, 40 (in section), 45
- Saint Roch flints, 30
- Salmon, Dr, on *hiatus* problem, 275 ; on tranchets, 277
- Salso Maggiore marl-bed, 293
- San Martino, lacustrine station of, 367
- Santarelli, Sig., and Bertarina hut-village, 412
- Sarajevo, Archæological Congress at, 452 ; list of savants, *ibid.*
- Sarauw, M., on a floating island, 279 ; on the archæological *hiatus*, 280
- Saussure, M. H., and Palæolithic station of Grotte de Scé, 70
- Sautuola, Don Marcelano de, 218
- Sauvage, M., and Denise fossil bones, 95
- Saws, of flint, 36, 378, 395
- double-handed, 378
- Scarabelli, Sig., on terremare, 332 ; on hut-dwellings, 411 ; and Frasassi cave excavations, 413
- Scé, grotte de, 69
- Sceatta*, 440
- Schaaffhausen, Prof., and Neanderthal skull, 96, 99 ; on Brünn skull, 171 ; on Sipka jaw, 176
- Schmerling, Dr, and Engis cavern discoveries, 92, 93 ; Belgium, early researches of, 116
- Schmidt, Dr R., and Ofnet cave discoveries, 259
- Schoetensack, Prof., and Heidelberg mandible, 178, 179
- Schussenried, Palæolithic station of, 75 ; Dr Fraas's investigations at, 76 ; Arctic mosses found at, 76
- Schwalbe, Mr G., on Eguisheim skull, 169
- Schweizersbild rock-shelter, 77 ; Prof. Nehring and Dr Nüesch on fauna of, 78, 79, 82 ; post-glacial deposits of, 273
- Scotti, Cav. Luigi, on terramara of Montata dell' Orto, 316
- Scrapers, 48 ; of flint, 32, 44, 59, 61, 69, 96, 136, 156, 279
- Sculpture, in stone, 208 ; ivory, 211
- Sea-dykes of Holland, 434
- Seine, ancient gravels of, 141 ; human remains found in, 141, 142
- Senses and environment, 8, 13
- Sepulchral caves of Mentone, 164 ; Palæolithic and Neolithic, 146-147, 151-152
- Sergi, Prof., on terremare, 319
- Serres, M. Marcel de, and Bise cave explorations, 91
- Serviola, hut-dwellings at, 401
- Shears, of iron, 440
- Sheep, four-horned, 441
- Shell-heaps of Oban, 264, 267 ; Oronsay, 268 ; Inchkeith, 269 ; Denmark, 280 ; Portugal, 284
- Shells, perforated, 69, 74, 122, 130, 137, 161, 163
- Sickles of bronze, 299, 300, 319, 333, 337, 374, 385
- La Tène type, 467
- Siffre, Prof., on Petit-Puymoyen mandible, 148
- Silber, Col., and exploration in L. Garda, 380

- Simian races and cranial development, 90, 102, 202
- Sipka cave and jaw, 176
- Skates of bone, 445, 451
- Skeletons of Chancelade, 65, 133; Mas-d'Azil, Brünn, and Paviland, 65; Lahr, 94; Tilbury, 106; Galley Hill, 109; Trou du Frontal, 120; Spy, 123; Cro-Magnon, 128; Ferrassie, 140; Grenelle, 141; Clichy, 142; Hoteaux, 151; Moustier-de-Peyzac, 152; La Quina, 155; Grotte des Enfants and Cavillon, 160, 161, 165; Barma Grande, 163; Brûx and Brünn, 169; negroid, 167
- Skulls of a native Australian and a well-formed European, showing cranial development, 22; the Béthénas, 71; Engis, 92, 93; Neanderthal and Canstadt, 23, 102; Tilbury, 107; Bury St Edmunds, 108; Galley Hill, 114; Trou du Frontal, 121; *Les hommes de Spy*, 126; Cro-Magnon, 131; Laugerie Basse and Chancelade, 133; *Homo Aurignacensis* and *Mousteriensis Hauseri*, 136, 137; Chapelle-aux-Saints, 138; La Truchère, 143; Marcilly-sur-Eure and Bréchamps, 144; Placard and Barma Grande Cave, 150; Grotte des Enfants, 165, 166; the Olmo, 168; Eguisheim, 168; Brünn, 171; Podbaba, 172; Fürst Johanns Hole, 175; Gibraltar, 180; of *Pithecanthropus erectus*, 187
- Sling-stones, 47
- Smeermass jaw, 103
- Smith, G. Worthington, on Palæolithic inhabited sites discovered at Cad-dington, 86; Bury St Edmunds skull figured by, 108
- Solutré, excavations at, by M.M. Ferry, Arcelin and Ducrost, 51; Palæolithic fauna, 52
- Solutréen epoch, 51, 201, 208; typical objects of, 52
- Somme Valley flints, 43
- Sordelli, Prof., on lacustrine organic remains, 353, 359, 371
- Spatulæ of horn, 327, 391; of bone, 285, 468
- Spear-thrower (*propulseur*), 211
- Spear-heads, of bronze, 299, 300, 330, 331, 359
of flint (laurel-leaf), 51, 117, 273
of horn, 391
of iron, 331
- Spindle-whorls, 301, 319, 357, 363, 370
of clay, 333
of terracotta, 331, 377
ornamented, 333, 439, 467
- Spoon, of bronze, 363; of clay, 396, 450
- Sprague, Dr T. B., on kitchen midden at Inchkeith, 269
- Spratt, Admiral, on immigration of fauna, and land bridges, 28
- Spurrell, F. C. J., on Palæolithic relics discovered at Crayford, 46, 87; on Tilbury skeleton and deposits, 108
- Spurs of iron, 356, 357
- Spurs of the cock, 440
- Spy, grotte de, 68; section of, 124; skeletons and skulls from, 123, 126
- Spy men, 123, 125
- Stag-horn, objects of, 378, 386, 387
- Stalagmite, 37, 59, 60, 68, 73, 119, 144, 175
- Statuettes in ivory and steatite, 174, 239
- Steel for striking sparks, 467
- Steenstrup, M., on kjökkenmöddings, 280, 283
- Stefani, Cav. Stefano de, and lacustrine exploration, 379, 383, 384, 386
- Stegodon remains, 185, 186
- Steinberg, 349, 355
- Stone implements, 29, 106, 177, 373, 377
- Stoppani, Prof., and lacustrine exploration, 347, 349, 355, 358, 362, 383
- Strobel, Prof., on terremare, 295, 296, 302, 303, 306; his list of fauna of the terremare, 342, 343
- Studer, Prof. T., on fauna of Schweizersbild, 78
- Submerged forests, 83, 84
- Sureau, Trou du, relics from, 123
- Swords of bronze, 337, 368, 423
- Szombathy, Herr, on a human skull, 175
- TABLET, stone, with outlines of wild ass and reindeer incised, 81
- Taranto, huts of, and terramara at, 335, 336
- Tardenoisien flint industry, 277
- Tassoni, Pietro and Giacomo, discover a terramara, 327

- Teeth of *elephas antiquus*, *meridionalis*, and *primigenius*, 30, 40, 41; fossil, 70, 169; perforated, 69, 74, 250
- Tergast, Dr, on warfen, 445
- "Terminal forms of life," 6, 14
- Terp, construction of a, 438
- Terp habitation, commencement of, 444
- Terpen, description of, 433-445; of West Friesland, 433
- Terra uliginosa*, 302
- Terracotta, figurine, 314; lamp, 323
- Terramara settlements, 304, 307, 310, 315, 316, 322, 324, 327, 331, 332, 335; extent of, 339; relics of, 340; sketch map showing distribution of terre-mare in the Po Valley, 341; organic remains of, 342; food, domestic and wild animals of the Terramaricoli, 342; Prof. Strobel's list of fauna, 342, 343; age of, 344
- Terramaricoli, culture and civilisation of, 321; burial customs of, 417; and of lake-dwellers, 421; the racial problem, 423
- "Terre à briques," 44; pipeclay, 44
- Terremare, discovery and structure of, 291; early opinions and theories regarding, 292-294; a development of lacustrine dwellings, 430; structures analogous to, in other European countries, 430-431
- Tertiary deposits, 40; Tertiary man, 89
- Thames terraces, 46; Valley, and early flint discoveries, 32, 56, 111
- Thenay, Tertiary deposits of, 89
- Thioly, M., and Veyrier caves excavations, 69
- Thomson, Dr Allen, on development of brain, 11, 12
- Throwing-missiles, 148
- Tilbury skeleton and skull, 106, 107; submergence and deposits, 108
- Tiles (Roman), 444
- Tinelli, Dr Carlo, on lacustrine remains, 360
- Torbay's submerged forest, 84
- Torques, 385, 386
- Torre Bairo, turbary at, 368
- Toscanello, hut-dwelling at, 411
- Tószeg, terramara at, 450
- Tourasse, grotte de la, 253
- Tournal, M., and cave of Bise discoveries, 91
- Tournier, M., and Hoteaux excavations, 151
- Toussaint, Prof., and osseous remains of Solutr , 52
- Tranchets, 275, 276, 277, 279, 280
- Traps (supposed), for beaver or water-fowl, 393, 394
- Trebbio Sei Vie, hut-remains at, 408
- Trilobite, grotte du, 48
- Trinil (Java) bone-mine and strata, 185
- Troglodytes. See Cave-dwellers
- Trogontherium, 40, 41
- Truch re, la, skull of, 143
- Truhelka, Dr Ciro, and "Gradina" excavations, 469-472
- Tubes of bone (as artists' flasks), 50
- Tundra and Steppe fauna, 79, 80
- Turner, Sir W., on the Java human remains, 192; on the Carse whales, 265
- UNGER, Prof. Franz, and lacustrine exploration, 382
- Unicellular organisms and the higher animals, 5
- Unio pictorum*, 306, 312
- Urn-burials, 417-423, 470-472
- Ursus spel us*, remains of, 48, 123, 124, 151, 175, 177
- VALCUVIA, Torbiera di, palafitte in, 361
- Varano, Lake of, palafittes in, 360
- Varese, Lake, palafittes in, 348; sketch map of, 348
- Vases, reconstructed from fragments found in Trou du Frontal, 122
- containing polenta, 360
- decorated, 373
- from Cataragna peat-bog, 380
- handles surmounted by button-shaped prominence, 377
- of Crespellano cemetery, 417
- ornamented with bird's head, 413
- with horned handles and impressed dots, 404
- Venturi on terremare, 293
- Venus impudique, in ivory, 239
- Verneau, Dr, on Mentone caves and ornaments, 163, 164; Grotte des Enfants skulls, 165; on negroid skeletons, 200
- Veyrier, Pal olithic station, 69; flint and bone instruments found at, 69, 70; the *b ton de commandement*, 70, 74

- Vézère Valley, 127 ; stations and caves of (map of), 128
- Viadana group of terremare, objects found on, 330
- Vibrata Valley, 414, 415 ; objects illustrating culture of the people of, 415
- Vibraye, Marquis de, on Arcy-sur-Cure jaw, 96
- Victoria cave (Settle), harpoon from, 270
- Vilanova y Piera, on the cave of Altamira, 218
- Villa Capella, terramara at, 330
- Villa, Sig. G. B., and lacustrine exploration, 363
- Villeneuve, M. le C., and Grimaldi caves excavations, 160
- Virchow, Prof., on Neanderthal skull, 102 ; on the Sipka jaw, 176 ; on femur of *P. erectus*, 188 ; Ojcow bones, 257 ; the Kuczorgó mound, 451
- Vire, M. Armand, on station of Lacave, 209
- Vivianite, amorphous, 440
- Volgu, laurel-leaf lance-heads at, 209
- WALL pictures in caverns, 217, 225, 229
- Wanken, M., and Predmost explorations, 173
- Warfen (East Friesland), 445
- Waveney River, flint-bearing gravels, 32
- Welsh and West of England caves, 62
- Whales' skeletons, 265
- Wheels, of bone, 298
of wood, 366
ornamented with graffiti, 327
- Whistles, of bone, 77, 81, 150, 211
of clay, 450
- Wilde, Sir W. R., on four-horned sheep, 441
- Windmill Hill Cave, and W. Pengelly's investigations, 60
- Wisdom teeth, 19
- Wood, Lieut.-col. E. R., and Gower caves investigations, 65
- Wood (perforated) as net-floats, 353, 368
- Wookey Hole, 66 ; Prof. B. Dawkins' table of fauna of, 67
- Woolly-haired rhinoceros, 48, 119, 122, 139, 141, 162, 176, 207 ; incised on plaque of schist, 49 ; engraved on stone, 207
- Worsaae, M., on kjökkenmöddings, 280
- Wurthen (Dithmarschen), 445
- Wyatt's section of Ouse Valley, 31
- ZANNONI, Sig. Antonio and Pragatto terramara, 410, 417
- Zawisza, Count, on Ojcow mammoth cave, 257



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